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METAL INDUSTRY

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BRASS FOUNDER and FINISHER

ELECTRO-PLATERS REVIEW

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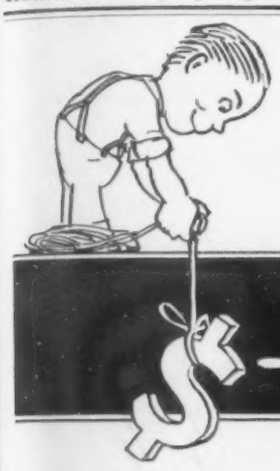

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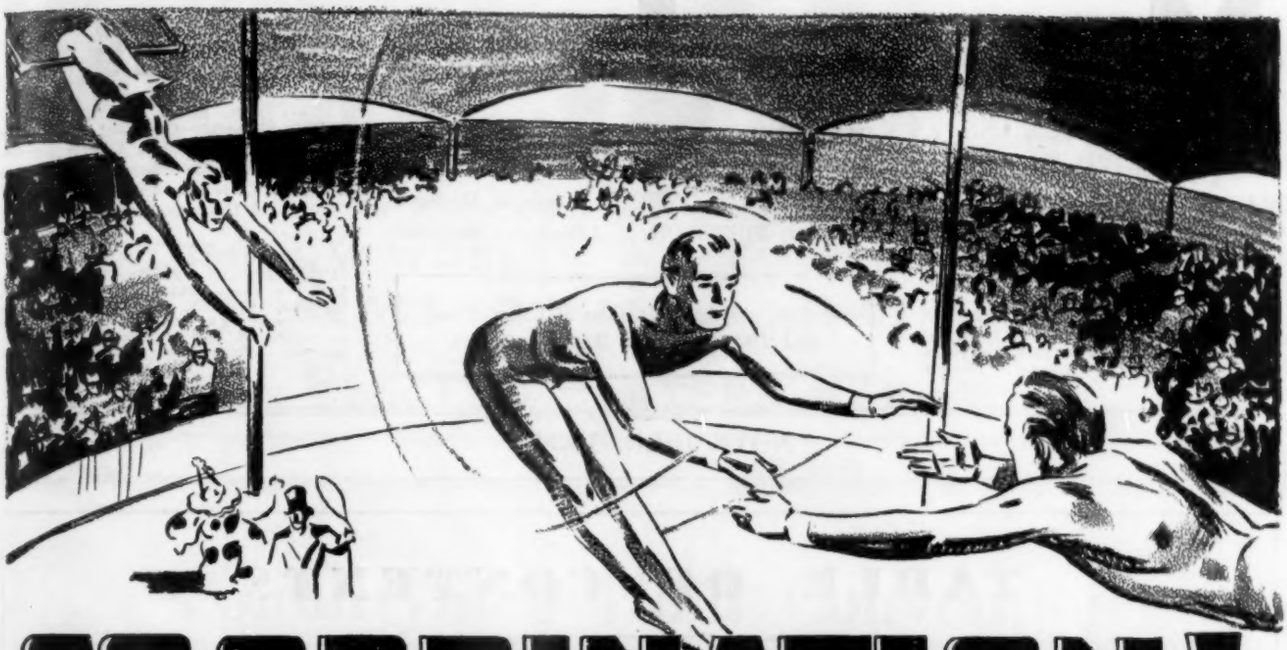

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VOL. 32 NEW YORK, NOVEMBER, 1934 No. 11

Foundrymen Hold Convention and Exhibition

Feature Symposium on Non-Ferrous Metals and Round Table Discussions. Arnold Lenz Awarded Whiting Medal

THE 38th annual convention and exposition of the American Foundrymen's Association was held in Philadelphia, Pa., October 22-26 at the Convention Hall. It was at the same time the 5th International Foundry Congress. It is safe to say that every foundryman who attended, no matter what his position or product, found something of interest and worth at this convention. The program was so arranged that in addition to the technical sessions and informal meetings of the four main divisions—Non-Ferrous, Gray Iron, Malleable Iron and Steel—the men in attendance participated also in discussions on topics of general interest, and were able to inspect the new equipment shown at the exposition. Among the general topics discussed were, refractories, sand control, pattern making, foundry equipment and apprentice training.

The annual banquet was held at the Bellevue-Stratford Hotel, on Wednesday, October 24th. The main speaker was Andrew W. Robertson, chairman of the board of Westinghouse Electric and Manufacturing Company, a nationally known speaker.

JEROME STRAUSS
Chairman, Non-Ferrous Division, A. F. A.

JOHN W. BOLTON
Vice-Chairman, Non-Ferrous Division, A. F. A.

WILLIAM ROMANOFF
Member, Advisory Committee, Non-Ferrous Division, A. F. A.

The attendance was excellent, not only in numbers (estimated at somewhat under 3,000) but also in the class of the visitors and the interest which they displayed in the meetings and the exhibits shown by the 110 exhibitors.

One of the enjoyable and valuable features of the convention was the opportunity to visit some of the most important plants of the country, such as the Bethlehem Steel Company, Philadelphia Navy Yard, Florence Pipe and Foundry Company, Budd Manufacturing Company, Henry Disston and Sons, SKF Industries, and the Radio Corporation of America.

The foreign delegates who attended the convention in considerable number, were taken on a tour to important points of industrial interest before they came to Philadelphia. They visited Buffalo, Chicago, Pittsburgh and Washington where they were met and entertained by prominent American foundrymen in each of these centers.

One of the highlights of the convention was the award of the Whiting medal for conspicuous contributions to the foundry industry to Arnold Lenz, a practical foundryman who worked his way up through the jobs of molder, core-maker and melter since starting out as apprentice over thirty years ago. Mr. Lenz is now assistant manager in charge of the Flint, Bay City and Saginaw plants of the Chevrolet Motor Company. A complete history of Mr. Lenz's career will be found on page 396 of this issue.

The time and place of the next convention have not yet been decided. Announcement will be made in due time.

Summaries of Papers for Brass Foundries

THE EFFECT OF ELEVATED TEMPERATURES ON THE STRENGTH AND DIMENSIONAL STABILITY OF CERTAIN ALUMINUM ALLOYS USED IN AIRCRAFT

By Richard R. Kennedy

A series of experiments were conducted on four aluminum alloys to determine the effect on the dimensional changes and physical properties of exposure periods up to 192 hours at temperatures within the range of 350-550 degrees Fahr. The copper-nickel-magnesium alloys (X and Y) in the heat treated condition were least affected. The 4 per cent copper—0.7 per cent silicon alloy showed considerable permanent growth after reheating. The 5 per cent silicon—1.25 per cent copper alloy had the lowest tensile strength and hardness of the alloys investigated.

DEOXIDATION AND DEGASIFICATION OF YELLOW BRASS

By L. A. Ward

The author has divided this paper into two parts. The first deals with deoxidation and the second with degasification of yellow brass. He reaches the conclusion that various deoxidizers are unnecessary and merely confer fluidity on the metal. Under degasification, the author gives three sources of gases in castings and points out the importance of the solubility of these gases at pouring temperatures and in the solid metal. He arrives at the conclusion that the best method of degasification probably is pouring the metal at as low a temperature as possible. A table accompanies the paper which shows the results of various deoxidizers and varying pouring temperatures on the physical properties of the castings.

POROSITY IN LEADED BRONZE BUSHINGS

By A. W. Lorenz

Porosity in cast products generally occurs as gas or blow holes or as shrinkage voids. One of the most common causes of blow holes is cold metal. Other causes are entrapment of gases due to the metal flow within the mold and improper gating. Mold washes tend to promote porosity in heavy castings made from the type of metal under discussion. The author also investigated a condition of porosity due to metal used and states that this is the only instance in his experience where metal could be blamed definitely. Boiling may be due to dross on the sides of the ladle. The author also conducted some experiments to determine the effect of phosphorus and zinc on an alloy containing 80 per cent copper, 7 per cent tin and 13 per cent lead. After careful investigation, he found that over one ounce of phosphor-copper or 1 lb. of

E. H. DIX, JR. C. M. SAEGER, JR.

Members, Advisory Committee, Non-Ferrous Division, A. F. A.

zinc per 100 lbs. of melt was sufficient to produce undesirable shrinkage in heavy sections. The author is of the opinion that the majority of shrinkage trouble is due to over-reduced metal.

MELTING NON-FERROUS ALLOYS IN A CUPOLA TYPE FURNACE

By W. C. Alvin

The furnace is much the same as that in general use in iron foundries, except for a few changes to adapt it to non-ferrous melting. The fuel used is a by-product pitch coke, called a fixed carbon fuel. A metal-fuel ratio of 12 to 1 is usually maintained. Metal and fuel are charged alternately. The metal can be tapped 1¼ hours after starting the fire, and after that, tapping is continuous. Necessary replacements of lead and zinc are made to the ladle after tapping. One addition to the usual cupola equipment is a smoke arrestor, needed because of the heavy zinc oxide fumes. Among the advantages given for cupola melting are (1) the convenience of continuous pouring; (2) the flexibility of the furnace, which can be operated entirely to suit production requirements; and (3) the low melting cost.

DEOXIDATION AND DEGASIFICATION OF NON-FERROUS CASTING ALLOYS: GENERAL PRINCIPLE

An Introduction to a Symposium

By C. H. Lorig

The presence of dissolved non-metallic elements in a melt may be ascribed to two major sources: (1) direct contamination by furnace fuels and products of combustion; (2) the metals used to make up the alloys. Moisture is responsible in many cases for the inclusion of hydrogen and oxygen.

The author described the principles governing the solubility of non-metallic elements in metals, the methods for controlling solubility and the importance of the furnace atmosphere. He also discussed the elimination of the harmful influences of non-metallic elements.

DEOXIDATION AND DEGASIFICATION OF RED BRASS AND BRONZE

Prepared by a Committee of the American Foundrymen's Association Non-Ferrous Division.

J. W. Bolton, E. R. Darby and O. W. Ellis

The authors make clear that if no oxides are present in copper, brass or bronze, no reactions involving the formation of steam or sulphur dioxide occur. Only when reactive oxides are retained in the metal can unsoundness due to steam or sulphur dioxide be looked for. There is, therefore, some justification for the terms "oxidized" metal, but whether oxidation is the most common cause of sponginess or porosity, is open to question.

The authors quote other workers to the effect that gas and shrinkage cause porous metal and inter-crystalline fissures; that the porosity of "oxidized" red brass and bronze is due to inter-crystalline fissures, not of necessity filled with oxide. These inter-crystalline fissures are identical in nature with the shrinkage cavities so common in castings. The surface of these tiny shrinkage cavities might or might not be coated with a film of oxide according to whether the gas which had seeped into or evolved within the cavity was oxidizing or not. In other words the microscopic fracture might have occurred first and oxidation later.

This type of porosity is now generally called "incipient shrinkage." Its causes are not yet fully known. It seems that it can be brought about by severe oxidation and also while melting under reducing atmospheres or excessive furnace temperatures. It seems also that severe oxidation alone would not cause incipient shrinkage. Also alloys devoided of oxides may suffer from hydrogen unsoundness.

The authors quote another worker to the effect that a slight amount of oxide in the metal is essential to the production of some types of metal castings from open flame furnaces.

The authors also discuss the effect of aluminum and silicon on brass as well as the effect of pouring temperature upon the incidence of incipient shrinkage.

Another of the papers included in the symposium on the deoxidation and degasification of non-ferrous casting alloys was **Aluminum and Its Alloys** by **H. J. Rowe.**

FOUNDRY MAINTENANCE

By Jas. Thomson

The author defines plant maintenance as "sustaining the plant and its equipment in good operating condition." He cites as the main functions of the maintenance department making emergency repairs, inspection, and keeping records. A typical organization for such a department in a large foundry is given, with a plant engineer at the head; in a smaller foundry, a master mechanic would have charge of such work. Periodic inspection and careful inspectors' records form the basis for constructive repair work, and also frequently prevent breakdowns.

MODERN EQUIPMENT USED IN CRUCIBLE MELTING

By Richard H. Stone

Crucible melting recently has received an impetus due to the adoption of fuels not generally used previously, to better refractories, greater crucible life and new furnace design, according to the author. By basing the economy of a fuel on the cost of a million heat units actually utilized, the author compares the costs of the various fuels available. He also outlines difficulties encountered with various fuels and how to overcome them and describes some new type installations which are giving good results. In discussing refractories for crucible installations, he gives instructions on the care of furnaces that will improve melting conditions and lengthen crucible life. He also describes several special crucible furnaces that are being widely adopted and outlines the advantages of several typical installations. At the end of the paper, a chart is given which analyzes the operating costs of modern crucible plants.

FLOWABILITY OF MOLDING SAND

By H. W. Dietert and F. Valtier

Flowability is defined in this paper as the property which enables sand to flow when a ramming energy is applied. The greater the ease of flowing, the more readily will the sand form a continuous and uniform mold surface. The authors describe a test for flowability, which consists of measuring the movement of sand grains after an initial ramming. The relation of flowability to the other properties of sand is summarized as follows: It is increased by a decrease in moisture in clay content, in green sand strength, in green permeability, or an increase in grain fineness towards the finer grain materials. Flowability is decreased by the addition of sea coal to molding sand.

A COMPARISON OF SOME METHODS USED FOR THE FINENESS TEST OF SANDS AND CLAYS

By R. C. Hills

In this paper, the author gives the results of an investigation of the better known wet methods for determining the fine-sized particles of clays, molding sands, soils, and other fine-grained natural or artificial substances. He gives special attention to molding sands, stating that their grain size is their most important single property. All the other properties of molding sands, such as strength, permeability, etc. are influenced to a large degree by the grain size.

SELECTING FOUNDRY CONVEYING EQUIPMENT

By R. J. Heisserman

The author outlines the survey that should be made by the prospective purchaser to assure himself that he is getting the best possible unit for his particular foundry and one that will have both low operating and maintenance costs. He outlines a prospective installation both from the engineer's and the purchaser's standpoint and gives a list of various types of equipment from which to choose. He also shows how the unit should be installed to provide for additions and illustrates such an addition for handling castings.

Exhibits of Non-Ferrous Foundry Equipment and Supplies

The exhibits were as usual of the widest variety, intelligently planned and attractively staged. The "noisy" or "active" types of equipment were as in the past, segregated for the convenience of both the exhibitors and the visitors. While no revolutionary developments appeared for non-ferrous foundries, a number of new machines were in evidence, as well as many useful minor devices and products.

Some of the most prominent exhibits for non-ferrous foundries are given below.

Ajax Metal Company, Philadelphia, Pa. Non-ferrous metal ingots of all kinds; phosphor copper; nickel alloys; alumium alloys; Tombasil (copper-silicon alloys); aluminum bronze.

Cleveland Flux Company, Cleveland, Ohio. Bras-Klean, a brass cleaner for five cents a pound.

Detroit Electric Furnace Company, Detroit. Mich. Indirect arc electric furnaces, from a small multi-purpose unit for small runs or test heats to large commercial installations. A new feature is the automatic rocking arc device which increases the angle of rock of the furnace shell automatically with the progress of the heat.

Illinois Clay Products Company, Joliet, Ill. Therm-O-Flake granules, a new mineral insulator made of vermiculite, a micaceous rock from Montana. Recommended for furnace insulation, bonding fire brick, furnace roofs, and cooling molten metal under close control in furnaces or crucibles. The last use is said to insure excellent insulation with little if any flux action with the bath underneath.

Lancaster Iron Works, Lancaster, Pa. New Lancaster mixing system. (For a more detailed description see page 393 of this issue).

Nassau Smelting and Refining Company, New York. Ingot metals of all kinds. Also an interesting exhibit of a section of a Nada bronze billet, 8" in diameter, 62" long, weighing 1050 pounds which had been drawn into four miles of wire.

Norton Company, Worcester, Mass. Fused magnesia refractory for melting copper-rich mixtures and nickel silver in crucibles; also for insulating Ajax-Wyatt and Northrup electric furnaces; grinding wheels of various new types of material.

Quandt Chemical Company, San Francisco, Calif. Core alloys and washes, recommended for non-ferrous metals, especially high lead copper mixtures; also magnesium alloys.

Tabor Manufacturing Company, Philadelphia, Pa. A variety of brass foundry molding machines and equipment; a new column squeezer designed especially for brass foundries.

Other exhibits of general interest were as follows:

Ajax Electric Furnace Corporation, Philadelphia, Pa. Ajax-Wyatt melting furnaces, now designed for increased capacity up to 3500 pounds.

Ajax Electrothermic Corporation, Trenton, N. J. Melting and heat treating furnaces, and induction drying ovens.

Ajax Exhibit at the Foundrymen's Convention

American Foundry Equipment Company, Mishawaka, Ind. Airless abrasive cleaning methods; Wheelabrator; Tum-blast; Wheelabrator rotary table; automatic continuous dust arrestor.

American Gum Products Company, New York. Core binders.

Arcade Manufacturing Company, Freeport, Ill. Molding machines of various types.

Asbury Graphite Mills, Asbury, N. J. Plumbago; core washes; blackings; all kinds of ground and refined graphite.

C. O. Bartlett and Snow Company, Cleveland, Ohio. New dust collector; mold conveyor.

Beardsley and Piper Company, Chicago, Ill. Molding machines, vibrators, shake outs, sand handling equipment and screens.

Bloomsbury Graphite Company, Bloomsbury, N. J. Foundry facings and graphite products.

Campbell-Hausfeld Company, Harrison, Ohio. Metal melting equipment in complete units, for oil or gas fuel, in stationary, tilting, crucible and barrel furnaces.

Carborundum Company, Niagara Falls, N. Y. Abrasive products; carborundum and Aloxite vitrified and Redmanol bonded foundry grinding wheels.

Carborundum Company, Perth Amboy, N. J. High temperature linings and cements.

Chicago Manufacturing and Distributing Company, Chicago, Ill. Foundry buggy ladle.

Chicago-Naugatuck Crucible Company, Chicago, Ill. Foundry crucibles.

Clearfield Machine Company, Clearfield, Pa. Sand mixing and tumbling machinery.

Cleveland Crane and Engineering Company, Woodcliffe, Ohio. Overhead materials handling systems.

Combined Supply and Equipment Company, Buffalo, N. Y. Chaplets; cast aluminum pattern plates.

Debevoise-Anderson Company, Inc., New York. Aluminum alloys.

William Demmler and Bros., Kewanee, Ill. Core machines.

Harry W. Dietert Company, Detroit, Mich. Sand and core testing equipment.

Joseph Dixon Crucible Company, Jersey City, N. J. Dixon crucibles.

Electro Refractories and Alloys Corporation, Buffalo, N. Y. Crucibles, high temperature cements, super-refractories, non-ferrous alloys.

Federal Foundry Supply Company, Cleveland, Ohio. Core binders, sand testing machines, chaplets, core washes, plumbago, sand blast nozzles, etc.

Foundry Equipment Company, Cleveland, Ohio. Core and mold ovens.

Foxboro Company, Foxboro, Mass. Temperature recording instruments; indicating, recording and controlling pyrometers.

Girard Smelting and Refining Company, Philadelphia, Pa. Non-ferrous ingots of all kinds.

Globe Steel Abrasive Company, Mansfield, Ohio. Metallic abrasives.

Hill and Griffith Company, Cincinnati, Ohio. Foundry facings, supplies, equipment, plumbago, etc.

Hines Manufacturing Company, Cleveland, Ohio. Aluminum flasks.

Illinois Testing Laboratories, Inc., Chicago, Ill. Portable pyrometers and stationary pyrometers for molten metal, core ovens, drying ovens, etc.; thermoelectric and resistance type.

International Nickel Company, New York. Nickel alloy information for non-ferrous foundries; Monel metal, pure nickel.

Johnston and Jennings Company, Cleveland, Ohio. Molding machines, vibrators and stars for cleaning castings.

Lava Crucible Company, Pittsburgh, Pa. Crucibles, blocks, furnace refractories, linings, super-refractories.

R. Lavin and Sons, Chicago, Ill. Ingot metals.

Linde Air Products Company, New York. Oxy-acetylene welding and cutting.

J. S. McCormick Company, Pittsburgh, Pa. Core washes, blacking, core binders, etc.

Michigan Smelting and Refining Company, Detroit, Mich. Brass, bronze and aluminum ingots.

Mullite Refractories Company, Seymour, Conn. Furnace linings, high temperature cements, refractories.

National Engineering Company, Chicago, Ill. Simpson intensive mixer.

New Jersey Silica Sand Company, Millville, N. J. Molding and core sands.

Niagara Falls Smelting and Refining Corporation, Buffalo, N. Y. Alloys for every foundry need.

S. Obermayer Company, Cincinnati, Ohio. Plumbago core and mold washes.

Pangborn Corporation, Hagerstown, Md. Blast cleaning without air; dust collectors.

Parsons Engineering Corporation, Cleveland, Ohio. Dust arresters, sand blast barrels, tumbling mills.

Paxson Company, Philadelphia, Pa. Foundry sands, facings and supplies.

George F. Pettinos, Inc., Philadelphia, Pa. Foundry sands, blasting sands, facings, blackings and cements, etc.

Pittsburgh Crushed Steel Company, Pittsburgh, Pa. Steel abrasives.

Pyrometer Instrument Company, New York. Pyrometers, (radiation and immersion).

Royer Foundry and Machine Company, Kingston, Pa. Scrap remover, sand separator and blender.

Safety First Shoe Company, Holliston, Mass. Safety shoes for foundrymen.

Simplicity Engineering Company, Durand, Mich. Shakeout screens, sand screens, conveyors.

W. W. Sly Manufacturing Company, Cleveland, Ohio. A new blast mill which uses no compressed air; improved flat bag dust filter.

Standard Safety Equipment Company, Newark, N. J. Dust protective equipment, respirators, masks.

Standard Sand and Machine Company, Chicago, Ill. Sand mixers and blending machines.

Steel Shot and Grit Company, Boston, Mass. Steel abrasives.

Steelblast Abrasives Company, Cleveland, Ohio. Steel abrasives.

Frederic B. Stevens, Inc., Detroit, Mich. "Everything for a Foundry." Foundry facings, supplies, equipment, fire brick, etc.

Stone Pattern Mount Company, Inc., Philadelphia, Pa. A compound and a method for mounting patterns and gates for machine molding.

Union Carbide Company, New York. Oxy-acetylene welding and cutting.

United States Graphite Company, Saginaw, Mich. Mexican graphite, plumbago, blacking, core wash, etc.

Vesuvius Crucible Company, Swissvale, Pa. Graphite crucibles in all shapes and sizes; graphite stopper heads.

White Brothers Smelting Corporation, Philadelphia, Pa. Brass, bronze and copper ingots; solder, babbitt.

Whitehead Brothers Company, New York. Molding sands, core sands, washes, partings and blasting sands.

Electric Furnace Operation at the Detroit Lubricator Company

By H. M. ST. JOHN

Chief Metallurgist, Detroit Lubricator Company. Associate Editor, Metal Industry.

The Current Increase in Foundry Activity Is Again Stimulating Interest in Melting Practice and with it Considerable Discussion of Electric Furnace Operation

H. M. ST. JOHN

ORIGINALLY the Detroit Lubricator Company used pit-fired crucible furnaces exclusively. These were replaced 7 years ago with indirect arc rocking furnaces and all melting since then has been done electrically. The experience gained during this period may guide other organizations seeking added operating economies and a means of improving casting quality.

The brass foundry of the Detroit Lubricator Company produces castings for a wide variety of products in a volume which has ranged, over a period of years, from 10,000 to 40,000 pounds of castings per day. The individual units weigh from 2 ounces to 100 pounds. A large part of the tonnage of this foundry goes into valves and other pressure castings which require a dense homogeneous metal.

The principal alloy melted has the following analysis:

Copper	79 %
Tin	2-2½ %
Lead	10 %
Zinc	8.5 %

The change from crucible to electric furnace melting has demonstrated that while the electric furnace probably does not turn out metal any better than the best produced in the crucible, the average quality of electrically melted brass will always be considerably higher than crucible brass.

The reasons for this are that the electric furnace offers a much higher degree of control and at the same time practically eliminates the human equation. Electric melting is a science, while crucible melting is largely an art.

Probably the most important advantage of electric melting is the opportunity it offers of materially reducing metal losses and of increasing the yield of good castings, also the utilization of cheaper raw materials with greater melting economy than is possible with fuel-fired furnaces.

Total overall plant metal losses in the plant being discussed range from 1.25% to 1.50%. This includes losses from melting, pouring, mechanical processing, sand blast, grinding, etc. Melting losses by actual test run less than 0.5%.

In comparison with this the metal losses in the fuel-fired furnace may run as high as 10% of the metal charged and usually do run between 3 and 4% in efficiently managed foundries. The Detroit Lubricator Company is saving not less than $7.00 per ton of metal melted in the electric furnaces over what was formerly possible in crucible melting.

Foundry records show a continuous increase in the percentage of good castings to total castings over a period of years. This figure has gradually climbed to its present value of 97%, the increase being ascribed to steadily improved foundry control, of which melting is an important part.

Approximately 63% of the melt represents good castings. Based on the weight of castings, cleaning room scrap has gradually dropped from 4.44% to 1.41% while shop scrap in the same period dropped from 3.80 to 1.29%. The figure for total scrap, which was 8.24% in 1926 has now reached 2.70% of the total melt.

As part of their final inspection all pressure castings are given a hydrostatic test. Average overall test losses are now a little under 1%. Water valves, for instance, on a 50 lb. cold water test have shown losses as low as 0.30%.

In our electric furnaces properly dried screw machine turnings, chips, borings and other small scrap are used with as much facility and success as ingot or large scrap. This makes possible a substantial saving in the net cost of the charge.

The non-oxidizing, quiet atmosphere in the melting chamber of the type of furnace we use, in addition to the constant stirring of the bath, nullifies the restrictions on the use of fine scrap inherent in fuel-fired furnaces.

The average mixture in a regular charge is:

Total Remelt	55%
Remelt 37%	
Borings 18%	
Ingot made from electric furnace metal	27%
New Metals	18%
	100%

A very pertinent factor in economic brass melting is the control of melting and tapping temperatures. Experience in the type of casting produced in this foundry has definitely established a pouring range of approximately 100°F. Metal tapped at the upper limit of this range can be poured before it cools sufficiently to cause excessive shrinkage in the molds. Within reasonable limits, any increase in the tapping temperature above this limit results only in an unnecessary expenditure for current. Excessive temperatures, of course, will produce gassing with its resultant porosity in the finished castings.

FIG. 1. AUTOMATIC EXPANSION VALVE
Used in both domestic and commercial refrigeration. A typical casting from the Detroit Lubricator Foundry

FIG. 2. STANDARD RADIATOR VALVE

Another typical casting produced by the Detroit Lubricator Foundry

In electric furnace operation, the tapping temperature is controlled to plus or minus 20°F. by means of the watt hour meter. Actual pouring temperature is controlled to plus or minus 10°F.

Another factor considered of great importance is the control of melting atmosphere. The atmosphere in a fuel-fired furnace contains oxygen, unburned fuel and the products of combustion, which include free carbon, carbon dioxide, carbon monoxide, sulphur dioxide and water vapor. The oxygen from these gases, reacting with the molten metal, produces objectionable oxides and seriously reduces the white metal content of the heat.

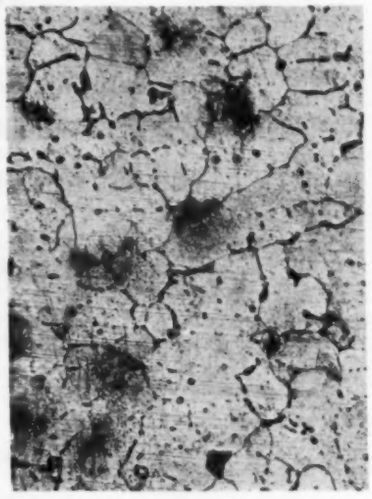


FIG. 3. POROUS METAL

Large dendrite crystals with weakened structure at boundaries

The electric furnace offers a simple and effective remedy for these difficulties, although reasonable care must be exercised even in electric furnace melting to maintain the desired melting atmosphere.

The electrodes of the indirect arc furnace are hot enough even before the charge becomes plastic to reduce all oxygen originally in the melting chamber. The electrode temperature is sufficient to reduce this oxygen to carbon monoxide which is harmless.

In electric furnace operation, it is necessary to keep the arc free burning, which is accomplished by ordinary vigilance on the part of the operator. The electrode ports must remain sealed to prevent the entrance of additional oxygen. These requirements, however, are very easily fulfilled by a competent electric furnace operator.

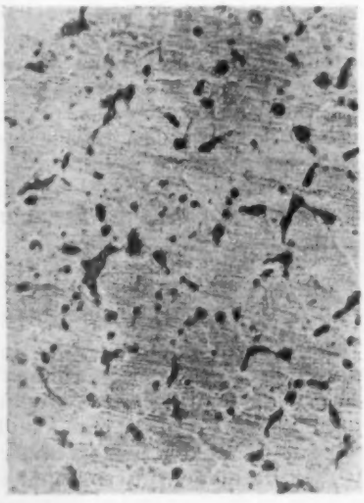


FIG. 4. NO. 7 ALLOY WITH 5% NICKEL

Poured at 2100°F. Four minute etch in 10% $(NH_4)_2S_2O_8$; X 250

National Metal Week

Institute of Metals Division Holds Meeting During This Annual Gathering of Metal Men. Discussions Held on Theoretical Metallurgy and Die Casting. Exhibit of Metal Working Equipment and Supplies

THE annual meeting of metal men—The National Metal Week—was held October 1-5, 1934. It consisted of technical sessions of the American Institute of Mining and Metallurgical Engineers (Institute of Metals Division and Iron and Steel Division), American Society for Metals (formerly American Society for Steel Treating), American Welding Society and American Society for Mechanical Engineers. The meetings were held at the Pennsylvania Hotel and also at the Port Authority Building in New York. We give below the abstracts of the papers relating to non-ferrous metallurgy.

Summaries of Papers on Non-Ferrous Metals

EQUILIBRIUM IN THE LEAD-ZINC SYSTEM WITH SPECIAL REFERENCE TO LIQUID SOLUBILITY

By R. K. Waring, E. A. Anderson, R. D. Springer and R. L. Wilcox

The liquid solubility curve of the zinc-lead system was established from data obtained by four methods. The solubility was found to be higher, and the temperature of complete miscibility lower, than the values reported by any previous investigators. Repetition of the methods of several previous investigators indicated the cause of the discrepancy in each case. The eutectic temperature and the monotectic composition and temperature were determined by thermal analyses. These results are in good agreement with those presented by previous investigators.

THE HIGH-ZINC REGION OF THE COPPER-ZINC PHASE EQUILIBRIUM DIAGRAM

By E. A. Anderson, M. L. Fuller, R. L. Wilcox, and J. L. Rodda

A thorough study of the eta solid solution of copper in zinc was made, utilizing the X-ray, electrical conductivity, and microscopical procedures. The course of the liquidus and solidus for the eta solid solution was determined and the peritectic temperature and peritectic point ascertained. Particular care was taken to insure reaching equilibrium. Mention is made of the advantages gained by the use of several methods of examination in avoiding super or under saturation.

EQUILIBRIUM RELATIONS IN ALUMINUM-NICKEL ALLOYS OF HIGH PURITY

By William L. Fink and L. A. Willey

Equilibrium relations were investigated for aluminum-nickel alloys containing 0 to 18 per cent nickel which had been prepared from high purity aluminum (99.985 per cent) and electrolytic nickel (99.38 per cent). Thermal analysis, electrical resistivity measurements, microscopic examination, chemical analysis of the separated intermetallic compound, and determinations of the solubility of this compound in molten aluminum were used to determine the various features of the diagram.

The intermetallic compound is $NiAl_3$. The eutectic between this compound and the aluminum solid solution occurs at 639.9° C. and 5.7 per cent nickel. The hypoeutectic liquidus is practically a straight line from the melting point of aluminum to the eutectic temperature. The hypereutectic liquidus temperature rises rapidly with increasing nickel to 805° C. at 17.8 per cent nickel. The solid solubility decreases from about 0.05 per cent at the eutectic temperature to about 0.005 per cent at 500° C.

It was also found that these aluminum nickel alloys are age-hardenable. The maximum observed increase in Brinell hardness of samples heat-treated at 625° C. was from about 16 to 27.

STUDIES OF PHASE CHANGES DURING AGING OF ZINC-ALLOY DIE CASTINGS

I. Eutectoidal Decomposition of Beta Aluminum-Zinc Phase and its Relation to Dimensional Changes in Die Castings.

By M. L. Fuller and R. L. Wilcox

The eutectoidal decomposition of the beta phase of the aluminum-zinc system has been studied with the purpose of determining the effect of this decomposition on the shrinkage occurring during the aging of zinc alloy die castings. It has been found that the beta phase decomposes in less than one week of aging in die castings. This rapid decomposition takes place in spite of the copper and/or magnesium present in zinc alloy die castings, whereas single phase beta alloys containing magnesium require over six weeks for complete decomposition at room temperature.

The increase in density or shrinkage which accompanies the beta decomposition has been measured experimentally and found to be consistent with the shrinkage calculated from crystal structure data. The possible influence of this shrinkage effect on the shrinkage occurring during the aging of zinc alloy die castings is estimated and discussed.

It is shown that the beta decomposition cannot be the sole cause of the aging shrinkage in die castings. Other phase changes which contribute to the shrinkage phenomenon will be reported upon in later papers. Additional data on the beta phase, primarily of fundamental interest, have been presented. These data consist of a measurement of the heat of decomposition, a study of the eutectoid temperature, and a discussion of the mechanism of the decomposition.

STEELS FOR DIE-CASTING DIES

By Sam Tour

A steel with maximum resistance to heat-checking should have a minimum coefficient of expansion and maximum thermal conductivity, elastic limit, and endurance limit. Practical requirements of a die-casting die steel are machinability, stability in heat-treatment, resistance to heat-checking, resistance to deformation, resistance to cleavage cracking, resistance to erosion and solvent action of molten aluminum, cleanliness, low cost, and satisfactory properties at elevated temperatures. Methods of service-testing proposed die steels are insertion of a piece around the gate, insertion of a piece in molten metal, or alternate dipping of water-cooled pieces in molten metal. Methods of laboratory testing are dilatometric, hardening of U-shaped pieces, hardness and tensile testing, and impact testing at elevated temperatures. Laboratory test results on a number of different steels are given.

PROPERTIES OF SOME BRASS DIE CASTING ALLOYS

By O. B. Malin and W. W. Sieg

The purpose of this paper was to study the effects of varying additions of small amounts of tin, aluminum, lead, etc., upon the properties of die casting brasses, Muntz metal or yellow brass mixtures. The conclusions drawn were as follows:

1. The addition of aluminum improves the working and finish of metal. Maximum strength is reached at ½ per cent aluminum. When iron and silicon are added, Rockwell hardness and yield points are increased but reduction of area and elongation are decreased. The first addition of aluminum decreases the ultimate strength, which then rises to about the same figure as it would if no iron or silicon were added.

2. Lead causes a reduction in ultimate strength reduction in area and elongation; the Rockwell number increases slightly and the yield point remains unchanged. Thereafter, the additions of iron and silicon causes a rise in yield point, strength and hardness and a falling off in ductility. Lead should be kept as low as possible, about 0.25 to 0.50%. Such quantities of lead improve the machinability and keep porosity at a minimum.

3. Tin, up to 0.5% increases the yield point, tensile strength and hardness of Muntz metal, but decreases the ductility. After that point, the addition of iron and tin increases the tensile strength without greatly changing the other qualities. Porosity is less than in the compositions containing aluminum but higher than those containing lead.

CORRELATION OF EQUILIBRIUM RELATIONS IN BINARY ALUMINUM ALLOYS OF HIGH PURITY

A Review of Previously Published Data from the Aluminum Research Laboratories

By William L. Fink and H. R. Freche

Certain qualitative relations between corresponding portions of the various binary diagrams as well as between different parts of the same diagram were noted some time ago by R. S. Archer. In the present paper these relations and others are considered quantitatively by the application of well-known thermodynamic equations or by newly discovered empirical relations.

A number of curves, tables, and equations are given which furnish a very satisfactory method of summarizing the data on a series of alloy systems. Moreover, such a satisfactory agreement between the experimental data and the thermodynamic equations gives added confidence concerning the accuracy of the results.

Not only do these relations apply to aluminum-alloy systems, but from the meager data we have they seem to apply also to other alloy systems. Consequently they may furnish criteria to appraise data in the literature, check experimental work, and select alloy systems for careful revision.

BRAZING WITH SILVER SOLDERS

R. H. Leach

This paper described the strength, ductility, corrosion resistance, electrical conductivity and other properties of silver solders, and the methods of using such solders; also the action of different fluxes. The author pointed out the advantages of silver solders for general industrial work, showing that although the cost per unit of weight is greater than in base metal solders, when all factors are considered, the cost of making joints with silver solders is not necessarily proportionately higher. The strongest joints are obtained by the use of a minimum amount of the solder.

SPRAYED METAL COATINGS

By E. V. David

This paper described the properties and a wide variety of applications of sprayed metal coatings, applied by the spray gun method. A portable spray gun, melts, atomizes, and sprays any commercial metal to form coatings on surfaces of any size and shape, and of almost any material. The coating may be built up to almost any desired thickness. The metal to be sprayed is used in the form of wire.

Some figures are interesting. Wire feed speeds can be run as high as 34 feet per minute for low melting metals. Area of metal coated to 0.006" in thickness varies from about 6 square feet per hour for iron to about 60 square feet for lead. The spray gun will deposit metal with a melting temperature as high as tantalum (about 5250 deg. F.) The sprayed coatings can be polished, ground, turned, etc.

Other papers read at the meetings were as follows:

Influence of a Grain Boundary on the Deformation of a Single Crystal of Zinc, by Richard F. Miller.

Fine Structure in Age-hardened Copper Beryllium. A Possible Indication of Secondary Structure, by K. H. Moore.

Effect of Quenching Strains on Lattice Parameter and Hardness Values of High Purity Aluminum-Copper Alloys, by Arthur Phillips and R. M. Brick.

Effect of Composition on Mechanical Properties and Corrosion Resistance of Aluminum Alloy Die Castings, by E. H. Dix, Jr., and J. J. Bowman.

An X-Ray Study of Orientation Changes in Cold Rolled Single Crystals of Alpha Brass, by Carl H. Samans.

Die Casting of Brass, by John R. Freeman, Jr.

Role of the Spectrograph in the Control of Die Casting Production, by T. A. Wright.

Determination of Orientations of Metallic Crystals by Means of Back-Reflection Laue Photographs, by Alden B. Greninger.

Intermetallic Solid Solutions, by Eric R. Jette.

At the dinner of the Institute of Metals Division and the Iron and Steel Division, the speaker of the evening was **Sam Tour,** vice-president of Lucius Pitkin, Inc., consulting chemists and metallurgists of New York. Mr. Tour spoke on the subject of **Die Casting.**

Exhibitors at the Exposition

The exhibits covered, as usual, every imaginable device and aid to metal fabrication and metal working. We give below a list of those exhibits of interest to non-ferrous metals.

Ajax Electric Company, Inc., Philadelphia, Pa. Electric ammonia dissociator; electric heat treating furnaces.

Ajax Electrothermic Corporation, Trenton, N. J. Induction melting furnaces.

Aluminum Industries, Cincinnati, Ohio. Permite leaded bronze bushings, bars, etc.

American Brass Company, Waterbury, Conn. Welding rods; various products made of Everdur, such as pressure tanks, welded vessels, etc. "Electro-sheet" copper for built-up roofs.

American Gas Association, New York. Industrial gas furnaces.

American Gas Furnace Company, Elizabeth, N. J. Melting and heat treating furnaces.

Aurora Metal Company, Aurora, Ill. Die Castings of aluminum bronze.

Bausch and Lomb Optical Company, Rochester, N. Y. Metallurgical microscopes, spectrographs and measuring instruments.

Bethlehem Steel Company, Bethlehem, Pa., "Bethanized" (electro-zinc coated) wire.

G. S. Blakeslee and Company, Chicago, Ill. Metal washing and cleaning machines.

Botfield Refractories Company, Philadelphia, Pa. High temperature fire brick cement and refractory materials.

Bristol Company, Bristol, Conn. Pyrometers; automatic temperature control equipment.

Brown Instrument Company, Philadelphia, Pa. Pyrometers and thermocouples.

Carborundum Company, Niagara Falls, N. Y. Abrasives, grinding and cutting wheels; refractory products.

Dow Chemical Company, Midland, Mich. Magnesium alloys; metal cleaners.

E. I. duPont deNemours and Company, Wilmington, Dela. **(R & H Chemicals Dept.)** Plating salts and chemicals; metal cleaners.

Ensign-Reynolds, Inc., New York. Soft metal melting furnaces; blowers and burners.

J. B. Ford Company, Wyandotte, Mich. Metal cleaners of all types.

Foxboro Company, Foxboro, Mass. Pyrometers and thermocouples.

Gehnrich Corporation, L. I. City, N. Y. Drying and baking ovens for lacquers, enamels, etc.

General Electric Company, Schenectady, N. Y. Electric furnaces.

General Electric X-Ray Corporation, Schenectady, N. Y. X-ray equipment for metallurgical testing.

Globe Machine and Stamping Company, Cleveland, Ohio. Tumbling barrels; stamping and assembling work.

Gogan Machine Corporation, Cleveland, O. Hardness testing machines.

Grasselli Chemical Company, Cleveland, Ohio. Inhibitors, fluxes, acids, chemicals for cadmium and zinc plating, sodium metasilicate and industrial cleaner; Cadalyte, a cadmium plating process.

Hauck Manufacturing Company, Brooklyn, N. Y. Oil burners and regulating valves.

Charles A. Hones, Baldwin, N. Y. Burners and appliances for metal melting.

E. F. Houghton and Company, Philadelphia, Pa. Industrial oils, belting, rust preventives, metal cleaners.

Illinois Testing Laboratories, Chicago, Ill. Pyrometers and thermocouples.

International Nickel Company, New York. Nickel and nickel alloys for non-ferrous metals, steel and cast iron; Monel metal.

Kelley-Koett Manufacturing Company, Inc., Covington, Ky. X-ray equipment for metallurgical testing.

Leeds and Northrup Company, Philadelphia, Pa. Pyrometers and thermocouples.

E. Leitz Inc., New York. Metallurgical microscopes and accessory equipment.

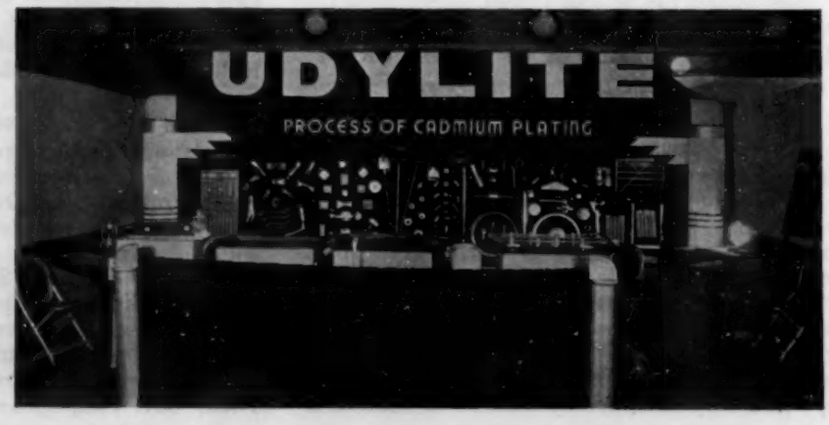
Madison-Kipp Corporation, Madison, Wis. Die casting machines.

Mears-Kane-Ofeldt, Inc., Philadelphia, Pa. Gas burners.

Metallizing Engineering Company, New York. Equipment and supplies for sprayed metal coatings.

Minneapolis-Honeywell Regulator Company, Minneapolis, Minn. Valves; automatic control systems for temperature and pressure for industrial furnaces.

Monarch Engineering and Manufacturing Company, Baltimore, Md. Furnaces for metal melting.



UDYLITE EXHIBIT
National Metal Week
Exposition, New York

New Jersey Zinc Sales Company, New York. Zinc and zinc alloys; die castings and rolled zinc.

Norton Company, Worcester, Mass. Grinding and cutting wheels, refractories.

Oakite Products, Inc., New York. Industrial cleaners of all types.

Pyrometer Instrument Company, New York. Pyrometers.

N. Ransohoff, Inc., Cincinnati, Ohio. Tumbling barrels; metal cleaning equipment.

Shore Instrument and Manufacturing Company, Jamaica, N. Y. Hardness testing instruments.

C. J. Tagliabue Manufacturing Company, Brooklyn, N. Y. Pyrometers and thermometers.

Testing Machines, Inc., New York. Testing machines.

Udylite Company, Detroit, Mich. Chromium and cadmium plating.

Waterbury Farrel Foundry and Machine Company, Ansonia, Conn. Wire drawing machinery.

Wilson Mechanical Instrument Company, New York. Hardness testers.

Carl Zeiss, Inc., New York. Metallurgical microscopes; spectroscopes.

Plating Specifications

Conference on Electroplating in New York City, September 26, 1934.

I. Introduction

This conference was held under the auspices of those committees of the American Electroplaters' Society and the American Society for Testing Materials that are directly interested in researches on electroplating and in specifications based upon the results. The meetings were open to all interested persons, of whom about 40 were present. W. M. Phillips, Chairman of the Research Committee of the American Electroplaters' Society presided, and W. Blum served as secretary. No stenographic report was made, but notes were kept of the recommendations, in some cases based on informal voting. The conclusions regarding the specifications for plating on steel and the program for exposure tests on non-ferrous metals will be incorporated so far as practicable into revised drafts that will be again circulated for comment. The purpose of this brief report is to indicate the scope and trend of the discussions.

II. Specifications for Plating on Steel

1. **Nickel and Chromium Coatings.** Two grades of plating were considered. Special emphasis was placed on the minimum thickness on significant surfaces, though requirements for the average thickness of copper plus nickel were retained. Details regarding the number of specimens for sampling, testing, and rejection were left to mutual agreement. It was recommended that the salt spray test should be conducted at a controlled temperature, and that failure should be defined in terms of the number and size of the rust spots.

2. **Zinc and Cadmium Coatings.** It was agreed that separate specifications should be prepared for zinc and cadmium coatings, with two grades of each. It was decided to specify only the minimum and not the average thickness of zinc or cadmium. It was reported that very promising "drop tests" for both zinc and cadmium are available, and will soon be published for trial and comment. Further tests were recommended to determine whether an accelerated test, such as the salt spray, is of value in testing zinc and cadmium coatings, of which the minimum thickness can be readily determined. It is believed by some persons that this test may detect imperfect plating, for example where the required thickness of zinc or cadmium is plated over scale or oxide on the steel.

III. Plating on Non-Ferrous Metals

There was general agreement upon the desirability of the program as outlined. Several additional base metals were suggested, including spring steel, gray cast iron and malleable cast iron, and high and low brass, both rolled and cast, and possibly aluminum. An effort will be made to include these with the other materials if space is available.

The details regarding the form and preparation of the zinc-base die castings were referred to a special committee, consisting of:

W. M. Pierce, Chairman, New Jersey Zinc Company, Palmerton, Pa.

J. C. Fox, Doehler Die Casting Company, Toledo, Ohio.

C. F. Nixon, Ternstedt Manufacturing Company, Detroit, Michigan.

Carl Huessner, Chrysler Corporation, Detroit.

IV. Future Plans

As mentioned above, the revised specifications and program will be circulated as soon as possible to those interested. In the meantime certain assured phases of the work will be initiated. The Research Committee of the American Electroplaters' Society is now engaged in a campaign to raise $5,000 per year for two years for the salary of the Research Associate and other expenses of the investigation. Inquiries regarding this fund should be sent to the Chairman, W. M. Phillips, General Motors Corporation, Detroit, Michigan, or to the Secretary-Treasurer, Walter Fraine, 507 Grand Ave., Dayton, Ohio. Inquiries regarding details of the specifications or of the new program should be sent to W. Blum, Bureau of Standards, Washington, D. C.

A Study of the Structure of Electro-Deposited Metals

By L. B. HUNT

FROM THE JOURNAL OF PHYSICAL CHEMISTRY, VOL. XXXVI, pp. 1006-1021, MARCH, 1932.
ABSTRACTED by DR. A. K. GRAHAM

A Critical Review of the State of our Knowledge of the Factors Which Influence the Structure of Electrodeposited Metals, and a Working Hypothesis to Account for the Observed Variations in Structure with Differing Conditions of Deposition and Amongst the Various Metals and their Salts.—Part 2.*

The Nature of the Crystal Boundaries

An interesting speculation which arises here concerns the nature of the intercrystalline boundary . . . and the best explanation would appear to be that suggested by Gough[24], of an intercrystalline zone occupied by a large number of very small crystallites, the orientation of adjacent crystallites being slightly different, so that the change of direction from crystal to crystal is achieved by an integration of small changes.

The Relation between Structure and Cathode Polarisation

The theory proposed by Blum and Rawdon[4] in 1923 may be said to hold the field today as a working hypothesis. Although various discrepancies between experimental observations and the results expected from the theory have been recorded by Graham[29], Macnaughton and Hothersall[30], and by Glasstone and Saniger [31], [32], it has not as yet been subjected to a theoretical criticism. It may be said at the outset that this hypothesis gives in general some indication of what is likely to result from a change in the conditions of deposition, and thus is of value in predicting alterations in structure. Decrease in grain size is in most cases actually accompanied by an increase in cathodic polarisation, but it is submitted by the present writer that polarisation is to be regarded more as a parallel result of certain other operative factors than as the first cause of decrease in grain size. The main idea of their theory is stated by Blum and Rawdon as follows:

"The forces which cause the atomic orientation or crystalline structure must be attractive, and must therefore counteract the tendency of the metal atoms to pass into solution as metal ions. In consequence the solution pressure of a metal crystal must be less than that of a single metal atom."

It is then assumed that the only solution pressure and corresponding normal single potential of any element which is characteristic and constant is that of the hypothetical single unoriented atom, or of a mass of metal, consisting of unoriented atoms. In support of this contention it is stated that the single potential of a metal varies with the state of division, being most negative for the finest state. Therefore, it is argued, a higher potential will be required to start a nucleus than to continue the growth of an existing crystal, and thus all factors which tend to increase the potential difference between cathode and solution will foster the formation of nuclei.

Now in the first place the statement that "the forces which cause the atomic orientation or crystalline structure must be attractive" deliberately ignores the existence of the repulsive forces which must of necessity balance the attractive forces in any solid body. Tomlinson[33] has recently shown that the repulsion is, in fact, the dominating factor in determining the properties of solids.

Further, an examination of the evidence submitted in support of the statement that the single potential of a metal varies with its state of division, discloses a misconception of the facts. The results of Lewis and Lacey[34] with copper electrodes are cited. These workers found that spongy copper electrodes varied amongst themselves by amounts of the order of 0.0003 volt, whilst coherent deposits might vary by as much as 0.01 volt. Three years later, however, Lewis and Brighton[35] found that sticks of lead scraped with a glass edge gave the same potential as lead deposited by electrolysis, either on lead or platinum, from lead perchlorate solutions. The average deviation was less than 0.0001 volt, and it was concluded that the lack of reproducibility in electrodes of solid metal is due solely to conditions of strain in the solid surface.

Reference is also made by Blum and Rawdon to Forster's "Elektrochemie wasseriger Losungen" (1922 edition). In a footnote on page 131 Forster states that the metals nickel, cobalt, and iron, in the finely divided state, possess higher potentials than in the compact state, as wire or foil, and gives as his authorities Schoch[36], Richards and Behr[37], Schweitzer[38] and Schildbach[39] . All these workers compared the potentials of nickel, cobalt and iron in the finely divided porous state, and in the solid state, and found that the finely divided metals gave potentials greater by about 0.03 volt. Schoch, however, came to the conclusion that the discrepancies were due to occluded hydrogen, and Schildbach found that by charging cobalt powder with hydrogen, potentials could be obtained which were still more negative.

On the other hand, Anderson[40] has recently investigated the electromotive behaviour of single

*Part 1 was published in our September issue. All references will be published at the end of the last installment.—Ed.

crystals of zinc, and has found that the potentials of large single crystals were "very nearly equal, if not identical to" those of the electrodeposited metal. Straumanis[41] has also recorded identical potentials for single crystals and polycrystalline aggregates of zinc.

Now it is not contended that the potential of a finely divided metal may not differ from that of the same metal in a more compact form, in much the same way that the vapor pressure of a liquid varies with the size of the drops, but it is contended that the analogy is wrongly applied to the case of electrodeposition. In all cases (with the exception of abnormal spongy deposits) compact metal is under consideration, which is being built up gradually from identical crystal units, regardless of the ultimate size of the crystals, and it is submitted that the electrode potential of this metal will not vary with differing grain size. (It is necessary to avoid confusing "fine grained" solid metal with "finely divided" porous metal). The state of our knowledge on the origin and seat of potential is decidedly controversial and uncertain, but it is known that potential difference is a surface phenomenon, dependent on the thermionic work function of the metal, the free energy of solvation of its ions, and the concentration of ions in the cathode film, and not on any solution pressure of the metal. In effect then, it is submitted that the basic conceptions of the theory of Blum and Rawdon are untenable. The reason that a certain parallelism exists between their theory and the observed phenomena is to be found in the fact that polarisation is dependent on the compensating processes operating to supply metal ions to the cathode film.

Development of a Working Hypothesis

It is now proposed to evolve a working hypothesis to account for the variations in the structure of electrodeposited metals by a study of the contents of the cathode film, or diffusion layer, in the light of the most recent views on the behaviour of ions in solution. By making a general survey of the behaviour of most of the metals which are capable of being deposited, certain generalizations may be deduced with regard to the predominating influences which govern the crystalline form of deposited metals. Before actually dealing with conditions in the cathode layer, however, it will be necessary to consider the state of affairs in the bulk of the solution. The solutions normally employed for electrodeposition are necessarily concentrated and often very complex, and the work which has been carried out on the theory of solution cannot be extended to these solutions as yet. For simplicity a solution will first be considered which contains only one simple salt of the metal to be deposited. This salt will, of course, dissociate to some extent into cations and anions, both of which will in all probability be hydrated. The remaining portion of the salt will remain as undissociated molecules, although complexions may be formed by combination with the simple ions.

The Extent of Dissociation of Electrolytes

Our ideas on the subject of the degree of dissociation of salts in water and other solvents have undergone considerable change during the last few years, but no attempt has so far been made to apply the more recent views to the study of electrodeposition. Since the enunciation in 1923 of Debye and Huckel's theory[42] of complete dissociation and interionic forces, and the consequent turning of opinion away from the views of Arrhenius, it has become apparent that the two ideas are not diametrically opposed, but should rather be considered as complimentary.

The interionic forces will vary with the charge on an ion, the distance separating it from oppositely charged ions, the size of the ion, and its electronic arrangement. Thus univalent ions will tend to be dissociated to a greater extent than will bivalent ions whilst the highly localized positive field on a small ion having a structure remote from the inert gas type will tend to cause deformation of the anion and so promote association. This effect will be greater the larger the anion and the higher the valency of either ion. The co-ordinating tendency of the anion will also have an effect in depressing dissociation. Solvation will reduce the effects of the positive charge on the surface of a cation, and so tend to increase dissociation. Ives and Riley[46] state that when the co-ordinating tendency of the anion is sufficiently great to break down the solvated ion system the effect of the localized charge reaches its maximum and feeble dissociation results. Koch[47] has shown that it is necessary to assume that the solvent molecules exert an attractive force on the ions, and that these forces are specific for any ion and solvent. He has further shown that dissociation must in general be of a complex nature. The metal ion may appear alone, together with complex anions, or it may be practically confined to complex cations, depending on the relative affinities of anion and cation for the solvent.

The Behaviour of Ions in Solution

In order to obtain a mental picture of the process of electrodeposition, therefore, it is necessary to revise our ideas on the behaviour of ions in solution. Ions must no longer be considered as independent entities, but as closely connected bodies having mutually operative forces acting upon them. The foundation of the Debye-Huckel analysis is the conception of the unequal distribution of the ions owing to the interionic forces. The attractive force between cations and anions will tend to bring them into closer proximity whilst the repulsive force between like ions will tend to remove them. Thus any given ions will be surrounded by more unlike than like ions. This ionic "atmosphere" must necessarily bear an equal and opposite charge to the central ion. On the application of an E. M. F. the ion and its atmosphere will be impelled in opposite directions by the current, and the atmosphere must be continually building up in front of an ion and falling off in the rear. Thus a retarding influence is exerted on an ion in its movement towards an electrode, and metal ions must be removed against this retarding force in order to enter the crystal lattice on deposition. In all probability, therefore, the polarisation accompanying deposition is bound up with this resistance offered to the process by the interionic forces.

After the removal of a metal ion from its atmosphere there still remains the solvent envelope, which must be dissipated before entry into the lattice can take place. If as has been suggested above, dipoles may occasionally remain attached to the metal ion after its arrival on the cathode, interference with crystal growth will result, with the consequent formation of a nucleus.

This Review will be concluded in an early issue. —Ed.

Jewelers' Low Grade Wastes. An Asset or a Liability?

How to Handle Materials Containing Gold, Platinum, etc., in Small Amounts*

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THE literature contains frequent accounts of savings that have been made by burning up old jewelry-shop floors, door mats, aprons, and the like, and it is true that even lowlier materials, such as the settlings of the water in which the jewelers wash their hands, will yield up value under proper treatment.

However, there have been many occasions when these low-grade materials have proven a loss, rather than a profit, through improper handling. The literature does not go so fully into this aspect of the case. This article, therefore, will suggest methods by which an owner can decide whether a given material is worth salvaging or not, and how to realize the best return.

PART I

The jewelry factory handles several different kinds of precious metal wastes. Highest in value is old jewelry or clean scrap metal. Next come the filings and clippings swept from the workman's bench; these contain in addition to the precious metals, more or less dust, emery, bits of wire, charcoal, iron from the files, scraps of tobacco and what-not; but in value per ounce they are only a little below the value of old jewelry. It is customary for most jewelry shops, even the small ones, to refine this material themselves, separating the metals and recovering them in pure form, the process being easy, and, if intelligently done, very profitable.

Next comes the dust collected in the polishing system; it contains rouge, lint from the buffs, and so on. Following that, floor sweepings, the residue that settles in the wash barrels, and finally old crucibles, the soot cleaned out of the flue over the melting furnace, old flooring, door mats, and such like. These latter materials, collectively known as "sweeps", will be discussed in this paper.

Undoubtedly sweeps contain value. But many people have spent more money in efforts to recover it than it was worth. It is not easy to draw the line between goods that it pays to refine in your own shop, goods that should be sold to a professional refiner and smelter, and goods which (like sea-water) should best be let alone, even though gold be present.

The bases of determination are: How much value is present, and how much will it cost to recover it? The latter depends in turn partly upon the amount of dirt present, but mostly on the character of the dirt.

Two Extreme Cases

Suppose one has a dollar's worth of gold, finely divided, and mixed with a quantity of wood, as in the case of old flooring, with gold embedded in the wood fibre, or in an old cocoa door-mat. Simple burning (so long as care is taken to keep gold from going up the flue) will almost solve the problem; pick out any old nails with a magnet, then flux off the few ashes with a little flux, and your metal is in almost salable form. Expense: perhaps 25c. or so for the crucible, three or four cents for fluxes and fuel, plus a little for labor, and the rest may be divided between profit and the overhead on the melting equipment.

On the other hand, suppose one starts with a dollar's worth of precious metals (gold plus silver plus platinum) mixed with a similar bulk of old crucibles, instead of wood. It would be necessary to (1) break up the crucibles, picking out and discarding the obviously worthless lumps; then (2) grind and sieve the rest, recovering the good-sized metallic shot; (3) mix the remaining fine dust with a large amount of flux and treat it for a considerable time at a high heat; (4) refine the resulting metal and the metallics from process 2 to separate the gold, silver, and platinum from each other and from the base metals present. The labor will be considerably more than in the first instance, the fuel expense will be higher, more flux will be needed, as well as a larger and more expensive crucible, and chemicals will be needed for the separation of the pure metals. Possibly the process will pay; but many a worker has found similar tasks unprofitable.

In other words, the presence of precious metal is only part of the story.

These instances are extreme cases—wood is easy to handle, and old crucibles (they are made of clay, sand, graphite, etc., which are especially chosen because they resist fluxing) are difficult to handle. The average job, in the average shop, would come somewhere between. Ordinarily the fine particles of metal will be mixed with fibres of wood, cloth, leather, plus sand, emery, paper, cigarette ash, peanut shells, polishing materials, soap, hair, and so on. Part can readily be removed by simple burning, the rest not so easily.

Suggested Procedure

It normally pays the average shop, having the average amount of space and facilities, to burn, grind, and sieve its sweeps, and to refine the metallic particles that are sieved out. It does not pay to refine the low-grade fine dust that passes through the sieve; this should be sold to a professional refiner and smelter. This statement covers a large majority of cases, and may well be followed in all cases of doubt. Every word should be noted carefully.

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The following plan is suggested: Do not let large amounts of floor sweeps accumulate. Handle each day's lot as it comes in, collecting it in a wire basket that rests in a metal box. This permits filings, small stones, etc., to sift through into the box below.

Collect the fine stuff and "pan" it, the way miners pan earth when looking for gold dust. If there is a possibility of the stuff containing small pearls or other objects that can be harmed by heat, pan it without burning it; otherwise burn it first to get rid of the grease. Also pass a magnet through it to take out iron and steel. (Some kinds of white gold are attracted by the magnet; if such metal may be present its peculiarity must be taken into consideration.)

It takes only a little practice to get the trick of panning—shifting the pan round and round, with water, letting the water and the lighter particles slip over the edge. Finally the bright metal will collect on the bottom. It may readily be possible to pan the stuff so well that the metal can be treated the same as high-grade wastes such as filings. But usually it will more suitably be melted up with a flux, as will be described later.

The papers, etc., in the wire basket, should be burned, and the ashes ground and sifted to say 20 to 40 mesh. The grains that will not pass the sieve should be examined; sometimes they are obviously of value and should be treated as clippings; in some cases they are plainly of no value and should be promptly discarded. Usually it is desirable to melt them down into a button, using a flux. This will be described later.

In some cases the material is then ground further, until the bulk of it will pass the 80-mesh screen, the metallics being again collected and united with those previously obtained, and the resulting button being refined by acid methods.

The fine dust is then packed in barrels and sold to a refiner, after a sampling process that will be described later.

There is some question as to the exact size or fineness to which this material should be ground before being passed along to the professional refiner. The process of grinding is noisy; also it calls for considerable energy—either hand power or electric current. Therefore in a small shop the process is not apt to be carried very far because of the noise; on the other hand if electric or other power is readily available, it is well to carry the process along further. The refiner's first task, after receiving and weighing and drying the stuff, is to grind it—a process for which he makes a charge; therefore if the owner is so situated as to be able to do this grinding cheaply himself, it is to his advantage to do it. Experience must be his guide.

Wash Barrel Residues

In the past, a jewelry factory was inclined to estimate its activity and importance by the number of barrels in which its wash-water was settling. Now however, many shops, especially where rents are high, are using only one or two small barrels, plus a filter press. The filter press yields a compact, almost dry cake, and has other advantages over the barrels as well. In either case the residue contains soap, grease, washing compounds, etc., and sometimes alum or other chemicals added to agglutinate the fine particles.

In general this material should be handled nearly the same as floor sweeps; that is, dried, burned, sieved, ground, sieved again, the metallics collected, and the fine dust that passes the last sieve should be sold to a professional refiner. The grease that is present tends to float off the fine particles of precious metals; for that reason panning is not apt to be successful.

Old Crucibles

As suggested above, these are rather difficult to handle, because crucible materials are of themselves difficult to flux and resistant to heat treatment. When breaking them up, if any lumps are plainly of no value, they should be discarded promptly; a little time spent at this task will pay for itself later. The remainder should be crushed and passed through a series of sieves, in order to recover the metallics, which sometimes are of good size and appreciable value.

It probably will pay to pan the dust; it pans much more cleanly than floor sweeps. If small lots are handled at regular intervals, the task is not tiresome. After panning, the remaining low-grade dust can be put in with other sifted dust from the floor sweeps or wash-barrel residue, to be sold.

The metallics, as usual, should be melted into a button; because of the admixture with sand and other highly refractory particles, this will require more flux than ordinary to obtain a clean button.

Fluxes

The word "flux" means to flow. The idea is to make the sand, dirt, emery, etc., become liquid and literally flow, so that the particles of metal (which also have become liquid because of the heat applied) can collect freely into a button. This is the most important duty of a flux. Sometimes other purposes are accomplished at the same time, as will be seen later. The choice of fluxing material will depend upon the nature of the material that is being handled, and the objects to be obtained.

Thus, if the metallics are fairly clean, consisting mostly of metal, they can be melted down with a little calcined borax (also called borax glass) without difficulty or great expense. The greater the proportion of dirt, sand and the like, the more flux will be needed.

Many shops will make up a "stock flux" in quantities; then when occasion demands they can add other ingredients to it. A popular stock flux consists of:

Soda ash (or preferably a mixture of soda ash and pearl ash)	About 5 parts
Calcined borax, powdered	3 or 4 parts
Broken glass, crushed	1 or 2 parts

These should be mixed well and kept very dry. The broken glass is not always easy to prepare, and some people do not use it. For each volume of low-grade dust, use at least an equal volume of flux; if the proportion of emery and sand is high, use more flux; if the proportion of dirt is low, use less flux.

If the melt tends to boil up and foam unduly, add some common salt.

In cases where the dust is almost wholly sand, as from old crucibles, add more broken glass, or preferably some fluorite; say an ounce to each pound of dust. Fluorite is especially good for fluxing sand; that means it will be correspondingly hard on the crucible in which the operation takes place.

If much carbonaceous matter is present, (that includes graphite), litharge should be added to the charge—say one to three ounces to a pound of dust. Litharge is a lead oxide; when heated it gives off oxygen which helps to burn the carbon. The metallic lead that is released will collect and wash down the metallic particles into a compact button.

Litharge is also advised for dust that contains very little metallic content, or in which the particles are extremely small in size. For that reason it is regularly used by the refiners and smelters when running down the low-grade dust that has been ground and sieved according to the procedure described in this article.

Platinum Only

If the only precious metal present in the dust or metallics is platinum (as in the case of the factory that handles platinum goods only) some other metal must be added to the melt to collect the platinum particles. The heat of a gas-air furnace simply will not melt platinum; even though the heat be adequate to flux the sand into a liquid, the platinum particles will not flow together unless some other metal, of lower melting point, is added to dissolve and collect it. Litharge is often used for this purpose. Or, if one has on hand some rolled-gold or gold plated scrap, or even brass or copper, this can be used instead. This helps to avoid the use of lead, whose fumes are dangerous, and offers an easy way to salvage the gold.

The resulting buttons will be refined by acid methods.

PART II.—THE LARGE PLANT

In Part I the problem of the average jeweler was discussed, and a procedure was suggested for handling the average quantity of floor sweeps, wash barrel wastes, old crucibles and the like. As a matter of interest we shall now describe the procedure followed by one of the largest bullion houses in the United States, where old gold and jewelers' scrap is handled literally by the ton, and platinum by the hundredweight. It is unusually well equipped, and has singularly excellent facilities for cost accounting; for that reason alone it is interesting in that it has checked the economics of various methods and has reported on its conclusions.

Briefly, it burns, grinds, and sieves its floor sweeps, collects and refines the metallics, and sells the remaining fine low-grade dust to a smelter. This in principle is the procedure recommended for the much smaller establishment.

The sweepings from the floor are first burned in a large furnace, so arranged that particles of metal will not go up the flue. In this plant, incidentally, there is a system for collecting flue dust from all the several furnaces, for the recovery of all values. The ashes are then ground in a large Hardinge conical mill. The dust travels over a 20-mesh screen, which automatically sends the larger particles back for further crushing. Most of the material passes this screen; the metallics that will not pass through are collected and melted up; they are usually of high value.

When this plant was first built, it used a mercury-amalgamation process as the next step. The material was mixed with water and passed over huge trays mixed with mercury; baffle-plates forced all the mud to come in contact with the mercury, which picked up most of the old gold and silver, forming an amalgam.

This amalgam was collected and refined, the mercury being used again and again. However, it was found that this mercury treatment did not pay, and this step has been abandoned.

After the material has passed the 20-mesh screen, the first step of the sampling process is taken. Every third shovelful is placed to one side and saved for sampling. The rest of the dust is placed in bags to be sold. It is interesting to note that this plant, though unusually rich and well equipped, does not attempt to refine this fine dust, but sells it to the highest bidder.

(There are only a few firms in the whole world that can economically refine this fine dust. The job calls for furnaces of huge dimensions, measuring ten to twenty feet or more on a side, and a single melt will run two or three days and involve tons of material.)

Sampling

Sampling is a long and painstaking process. A large plant, such as the above, will have the necessary equipment for this task; the average shop probably cannot afford it. But there is another reason why the small shop does not attempt to sample—the big refiner would not accept his figure. The refiner will in effect say this: "We have perfect confidence in your good faith; however we know from long experience that the job of sampling calls for skill, patience, and suitable equipment, and we shall therefore courteously insist upon doing the sampling ourselves."

As a result, the sampling is usually done in the presence of representatives of both buyer and seller, and usually at the plant of the buyer. The large plant we have been discussing is unusual in having space and equipment under its own roof for this process; therefore does its own sampling, but always has representatives of one or several buyers present while the work is being done.

The material (every third shovelful of the ground and sifted sweeps) is carefully mixed and piled in symmetrical cones, then quartered by means of a straight-edge. One cone in four will be set aside, the rest added to the stuff already bagged. The fourth cone is combined with the fourth cone from other piles, and is again ground to pass a finer sieve—say 80-mesh. The process of piling and quartering is repeated until the bulk has been greatly reduced—in this case to about forty pounds.

This is divided into four final lots; one goes to an outside chemist for assay, another is set aside as a reserve to use in case of dispute; the rest is distributed to the refiners who wish to bid on the lot. The one offering the highest bid will receive the entire lot, though if two bids are very close it is customary to divide the lot between the two, handing alternate bags to each. If the stuff is to be shipped any distance, it is packed in air-tight drums, to prevent loss.

Equipment

The choice of equipment is governed largely by the size of the lots to be handled. Thus, the small shop will burn its sweepings in a big frying pan, pouring on gasoline and burning until the stuff will burn no more. It will grind the residue in a hand mortar, and sieve by hand. A small gold-melting furnace will take care of the melting of the metallics.

A somewhat larger shop will burn its sweeps in a stove made for the purpose—a simple affair, not unlike the old-fashioned woodburning heater. It will grind the ashes in a small tumbling barrel, using iron balls, and will sieve by hand. The gold melting furnace will take care of the melts.

The larger plant, as described, will have automatic machinery for grinding, sieving, and mixing, and equipment for sampling and bagging.

The final smelting—the smelting down of the fine dust at the plant of the professional refiner—will take place in huge reverberatory, or blast furnaces. But that is beyond the range of this article.

Bronze Propellers for the Greatest Liner

By A. EYLES

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ALTHOUGH launched successfully on September 26, the new mammoth Cunarder, Queen Mary, must take many months to complete. In fact it is expected that only in the early part of 1936 will the liner be ready to be placed in commission on the Southampton, Cherbourg, New York service. Perhaps the length of time required to put the finishing touches will serve to bring out the immense size of this new Cunarder even more clearly than a mere recital of dimensions: overall length, 1018 ft.; beam, 118 ft.; depth from keel to the highest point of the superstructure, 135 ft.

The new liner has four bronze propellers with four spares, the order being equally divided between Messrs. J. Stone & Company, Limited, Deptford, London, S. E. 14, and the Manganese Bronze & Brass Company, Millwall, London, E., England.

The propellers supplied by Messrs. J. Stone & Co., Ltd., are made of Turbiston bronze (composition: Copper, 55; Zinc, 41; Nickel, 2; Manganese, 0.16; Iron, 0.84; Aluminum, 1). For each casting 53 tons of this alloy were used. The propellers which are four bladed, are nearly 20 ft. in diameter, the pitch being 18 ft. 2 ins. while the finished weight of each is 35 tons. The propeller cone caps are also of the same metal and weigh nearly one ton each. These propellers are the largest in the world and exceed the next heaviest by more than ten tons each.

The casting mold which was placed in the casting pit was of brick and loam construction and weighed nearly 80 tons. The molton metal was carried from the furnaces by overhead travelling cranes in ladles carrying 20 tons each. The casting took eight days to cool off before being removed from the pit.

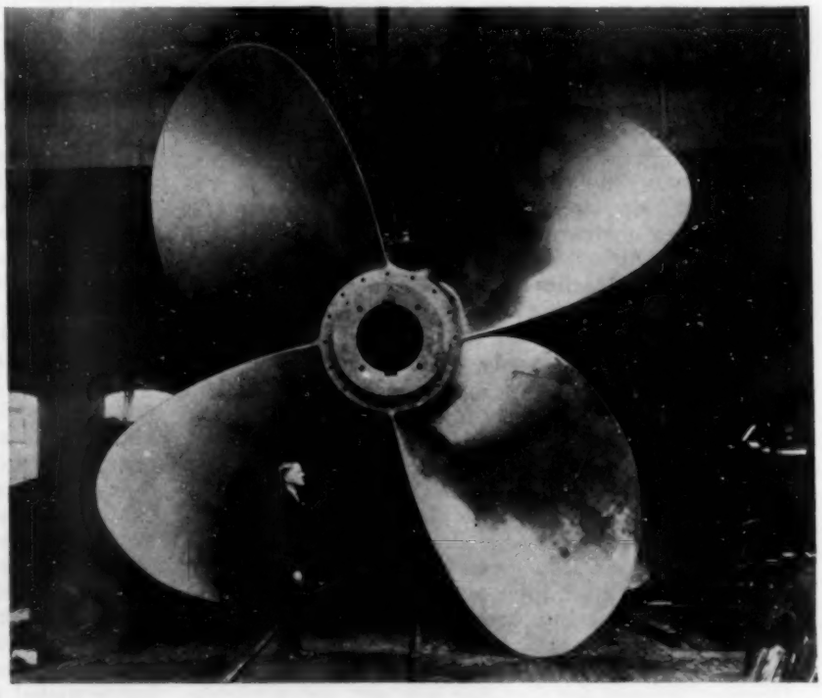
Each propeller casting was transferred to the machine shops by overhead travelling cranes and placed on a vertical boring mill. This boring mill is the largest of its kind in the world. Weighing more than 150 tons, it is mounted on a concrete foundation for which over 200 tons of concrete were used. The first operation on the machine was cutting off the head against which the metal was poured. This head weighs more than ten tons and the cutting off was done by a circular saw 6 ft. in diameter, the largest circular saw, it was stated, yet employed for cutting through metal. The base of the propeller, which eventually takes the propeller shaft, was then bored. This was followed by the facing of the fore and aft of the base and the cutting of the shaft keyways. The propeller was then transferred to a propeller planing machine and the blades planed true to pitch. Here again the planing machines are claimed to be unique. The propeller was then polished all over by rotary grinders and polishers and when finished had a mirror-like appearance.

Each propeller was subjected to a severe test on a balancing machine whereon, by the slightest touch of the finger on the extreme edge of the blade, the propeller must revolve, and be stopped again with equal ease, so keen is the balance.

For comparison purposes the weight and dimensions of propellers fitted to other liners are given. All these are made of Turbiston bronze.

Ship	Casting Weight	Finished Weight	Propeller Diameter
Queen Mary	53 tons	35 tons	20 ft. 0 in.
Mauretania	29 tons	18¼ tons	16 ft. 9 in.
Majestic	30 tons	15¼ tons	16 ft. 6 in.
Bremen	35 tons	18¾ tons	16 ft. 5 in.
Europa	27 tons	14 tons	15 ft. 0 in.

Propellers in Stone's Turbiston bronze were first made in 1899 and since have been supplied to the world's navies and mercantile marine. They are fitted on the largest and fastest vessels afloat. During the World Great War over 5,000 tons of propellers were supplied by Messrs. Stone & Co., Ltd., for the British Navy and many thousands of tons for the Allied Fleets.



One of the Four 70,000 lb. Propellers for the New Liner, Queen Mary

EDITORIALS

The Course of Recovery

WE ARE now in the midst of the Fall and the course of business is being watched as never before, with one eye on statistics and the other on Washington.

The path of business in the past few weeks has been slowly upward. This is best evidenced by slow but uninterrupted rise in the New York Times Index from about 72 in the middle of September to 76 for the week ending October 20. The week ending October 27 showed a recession to 75.2. Employment and payrolls have followed this curve both up and down fairly consistently. Unemployment rose in September to 9,976,000, 177,000 over August and 1,037,000 over the low point in May, 1934, according to the National Industrial Conference Board. Unemployment was heaviest in the manufacturing and mechanical industries, totalling 4,217,000 in September. This of course includes the so-called heavy or capital goods industries and also the textile industry, which was beset by a strike during that month. In the transportation industries, almost 1,300,000 were unemployed.

General distribution and trade advanced in September as compared with August, by an amount less than usually seasonal. Department store sales increased, but also less than seasonally in dollar value of turnover in September as compared with August. Retail sales conditions are not discouraging; in fact they are the best appearing branch of general business today.

As always, the Government and of course, the public, through the press, are favored with advice from any and all quarters, most of it of little value because it is ill-considered or based entirely upon the self-interest of the advisers. However, some of the statements are worth keen attention. For example, John W. O'Leary, president of the Machinery and Allied Products Institute stated recently that ". . . a definite commitment by the Federal Government that it has no intention of making any further inroads into the field of private business would undoubtedly see a sharp upbound in economic recovery. In our own particular field of activity, there is no doubt that fear of government competition and the uncertainty of what Washington's next move will be, have seriously retarded improvement." This point of view was also aired at the recent convention of the American Bankers' Association at which amicable relations seemed to be re-established between the administration and the bankers. This is encouraging if strictly correct. There is a feeling in some quarters that said relations are not really as pleasant as the platform speeches sounded.

Detailed figures for October are not yet available at the time of writing. The only guide, if it can be called a guide, is the announcement by Henry Ford that the depression is over so far as he is concerned, and that he will manufacture 1,000,000 cars in 1935. We echo business sentiment when we say, "Good Luck!" But we shall be surer of his selling his output when we see it accomplished. At any rate, it is a brave and timely gesture.

In the meantime, the rank and file can serve themselves best under the policy of wait and see.

Metal Progress

THE occurrence of two national metal conventions and expositions during the past month, naturally prompts us to take thought on the progress that metals have made in these last few hard years. For that reason a recently metallurgical review by Sam Tour is particularly timely.

The past five years have witnessed considerable development in the fabrication and application of aluminum, copper, zinc, lead, nickel and magnesium. Aluminum has certainly had the most widespread notice. It has gone into transportation (railroads, trolleys and buses) on a huge scale, competing evenly at least, with stainless steel for railroad rolling stock for example. Other important developments, although not so widely publicized, include its use as foil for thermal insulation and for wrapping foods; in oil refineries for resistance to hydrogen sulphide; for resistance to fruit juices, cleaning solutions, etc., after anodic oxidation.

Copper has stood out for several important developments; the commercial manufacture of oxygen-free high-conductivity copper; increased use of copper-silicon alloys; the commercial application of copper beryllium alloys; the successful operation of die casting in copper-base alloys; the swaging of tubing; the production of electro-deposited copper sheet and foil. Also there is the coming process of casting sheet directly from the molten metal between slowly revolving rolls. This process when finally perfected, may revolutionize the brass mill.

Lead has attracted attention in the form of alloys with calcium; also with tellurium. It is finding wider use as a cushion material in foundations and under rails. It is also widening its outlets as a protective coating on metals and other materials, being applied by the spray gun or immersion.

Magnesium has made long strides forward. Its alloys are now being produced in sand castings, die castings, forgings, structural shapes, plate, sheet and strip. Its outstanding advantage is, of course, its extremely light weight, about 30 per cent less than aluminum.

Nickel is now obtainable in very pure state. Malleable nickel has been found effective against caustic soda. Copper-nickel condenser tubing is growing in popularity. Monel metal continues to spread among kitchen installations, laundries, soda fountains, chemical plants, dyeing machinery, etc.

Zinc has been noteworthy also for the high purity metal now obtainable, which is particularly adapted

to die castings, but it has also opened up possibilities in the extrusion, wire, brass, dairy and pharmaceutical fields. Mr. Tour states that for die casting the copper-free zinc base alloys are now superseding the copper-containing alloys in many cases because of their better dimensional stability and retention of impact strength. The Tainton process of electro-galvanizing has succeeded in obtaining heavier coatings on a commercial scale with good adherence and ductility. Zinc alloys with a small percentage of copper are growing very popular in the rolled zinc using industries.

It is clear from even a glance at such a list that metals have not stood still even in the hardest years since the large scale development of American industry.

Metals Lead in Home Moderization

FIGURES are now available on the progress of the Federal Housing Administration, created under the National Housing Act (see the **Metal Industry** for September 1934, page 312). According to reports from Washington, about 30 per cent of the money advanced to home owners in modernization loans is being spent for new heating equipment and plumbing improvements. Some of the leading uses to which these loans are being put are heating repairs, plumbing repairs, bathroom re-modeling, improvements to metal kitchen equipment, roof repairing, etc.

Clearly, these uses call for metals and metal finishes. They also mean improvement in the heavy industries which have been the chief sufferers to date. The building industry alone, at one time, maintained 5,000,000 people in steady employment and it is in this class of operations that our worst unemployment exists. For that reason, since this line of endeavor seems to be on the right track, the Housing Administration is pressing forward. It recently reduced the interest rates to 5 per cent, with a maximum of 1 per cent additional for such charges as investigation, mortgage insurance, etc. The Administration does not lend money; it simply insures the loans made under its regulations by private lending agencies. This insurance of course makes the private lending much safer and consequently, the agencies are more liberal in granting loans.

It is for that reason that we have been hearing in the last few weeks of large housing plans. For example, the Public Works Administration plans a five-year program of low cost housing construction. Only shortly after this announcement, Henry I. Harriman, president of the Chamber of Commerce of the United States, urged a $15,000,000,000 low cost housing program, privately financed and spreading over ten years, as a partial solution of the unemployment problem.

Just which plan is put into operation is neither here nor there. The fact is that the program of business revival and the reduction of unemployment has been pretty well localized in the heavy industries, and any improvement that can be effected in these quarters will be very quickly felt in general gain.

A Valuable Meeting

THE recent convention of the American Foundrymen's Association (reported in detail on page 369 of this issue) was the first of such scope in four years. We have again returned to the good old fashioned convention with dozens of meetings and hundreds of exhibits of all kinds. To quote the report, it is safe to say that every foundryman who attended, no matter what his position or product, found something of interest and worth at this convention.

One of the valuable features was the opportunity to visit some of the largest and most important plants in the country. For example, at the Bethlehem Steel Company, the visitors saw a brass foundry completely equipped for centrifugal casting, in addition to the usual run of non-ferrous work. Papers were presented on brass, bronze and aluminum. There was an interesting symposium on the deoxidation and degasification of non-ferrous alloys, such as yellow brass, red brass, bronze and aluminum. Cupola melting of brass was described. In addition there were discussions on topics of general foundry interest, such as maintenance, crucible melting, testing sands, etc.

The equipment and supplies shown were interesting, not because there was anything revolutionary, but because they showed that the industry had continued to keep its face forward, with improvements in detail if not in fundamental principles. Many machines had been redesigned, many devices improved in structural details, many useful minor supplies had been developed.

That the industry welcomed the return of this convention and exhibit was shown not only by the goodly numbers but the high calibre of the attendance. We hope that the Foundrymen's Convention will be with us again next year.

Wasteful Righteousness

WE WERE recently confronted by an illustration in the daily press which showed the Mayor of New York wielding an ax on some of the 1155 slot machines which had been confiscated as gambling devices. Here we have the forces of righteousness triumphing over evil, and the world made safe for virtue! Then we noticed another part of the caption under the illustration—these machines were later dumped into the sea—and we were struck by another thought. There were 1155 machines in this lot. Each one must have weighed at least 50 pounds. The operating mechanisms are to a great extent, non-ferrous metals, die castings, with brass and bronze liberally sprinkled throughout. A rough guess at the non-ferrous metal content led us to the figure of 25,000 pounds. At even such a low price as one cent a pound, the lot would be worth $250. as it stood, all smashed up.

We protest eagerly that we approve the smashing of these gambling devices; we approve the publication of the act of smashing; we approve of everything—except paying for haulage from the Police Department to the Long Island Sound, 50 miles away, and dumping at least 25,000 pounds of metal.

Perhaps New York is not so poor as we have feared. Perhaps also since fruit growers and cotton growers destroy their products to keep up prices, city administrations have been affected—or should we say "touched". Perhaps—but who knows? At any rate from 25,000 to 50,000 pounds of metal have been wasted.

Correspondence and Discussion

The Effect of Conditions of Plating on Corrosion Protection

To the Editor of **Metal Industry:**

In your editorial entitled "Specifications for Plating", published in the October issue of the **Metal Industry,** you refer to the valuable outdoor exposure tests being carried out by the Bureau of Standards in cooperation with various interested organizations. You quote a report of the findings and recommend that every plater learn them by heart.

You are right in emphasizing the value of this work. It would be unfortunate, though, if platers generally were to get the idea fixed in their minds that, "the conditions of nickel plating have very little effect on the protection against corrosion." Such a sweeping generalization is not warranted by the results and probably was not intended by those who wrote the report. The wording of this part of the report seems to me to require limitation.

So far as the conditions of nickel plating were varied in these tests, the statement is in accordance with the results. However, these tests embraced comparatively few variations in the conditions of nickel plating. This was unavoidable if the number of samples was to be kept within reasonable bounds. Accordingly, a few procedures, representative of good established practice, were selected. The tests show that as far as those procedures are concerned, the results are about the same, and the thickness of the deposit determines the protection afforded. It is not safe to conclude from these results that the same thing would necessarily hold for other conditions of nickel plating, and it should be made clear that the conclusion in the summary of the report refers only to the conditions of plating actually employed.

I am sure that it was not the intention of Dr. Blum and his co-workers to express a conclusion that was not warranted by their results. Nevertheless there is a distinct danger that this sentence standing alone may be misconstrued, especially if it is learned by heart and becomes one of the axioms of the plating fraternity.

Nickel plating is being studied more intensively than it ever has been before. The conditions of nickel plating and of preparing the work for plating have a marked effect on the structure and physical properties of the deposit. May we not hope that some of these investigations will teach us how to produce nickel deposits, which are less porous and which, therefore, will give better protection than any now known?

LOUIS WEISBERG

New York Weisberg & Greenwald, Inc.

Safe Metal Polishes

To the Editor of **Metal Industry:**

With reference to the editorial on Marine Fires and Metal Polishes on page 353 of your October issue, I should say that the choice between different grades of polishes used is more a matter of prejudice than of efficiency. There are safe water base products which are as efficient as the naptha base type which many of the stewards prefer.

FOSTER D. SNELL

Brooklyn, N. Y. Foster D. Snell, Inc.

New Books

America's Capacity to Consume, by M. Leven, H. H. G. Moulten and Clark Warburton. Published by the Brookings Institution, Washington, D. C. Size 5 x 8; 272 pages. $3.00.

This is a companion volume to the book America's Capacity to Produce, which was reviewed in our September issue. It is the second volume in a series of four studies devoted to an analysis of the relation of the distribution of national wealth and income to economic progress. In this volume the authors show how the national income is divided among several income groups in society, the character of the consequent expenditures made by families at the various income levels and the bearing of income distribution upon its allocations between spending and saving. Results are represented in concise and graphic form.

Some of the conclusions are very interesting.

(1). During the so-called "new era" in the nineteen twenties, the United States was not living beyond its means.

(2). There has been a tendency for the inequality to the distribution of income to be accentuated.

(3). Vast potential demands exist in the unfulfilled wants of the masses of the people.

(4). The United States has not reached a stage in which it is possible to produce more than the American people would like to consume.

(5). We cannot materially shorten the working day and still produce the quantity of goods and services which the American people aspire to consume.

The Manufacture of Seamless Tubes; Ferrous and Non-Ferrous, by Gilbert Evans. Published by H. F. and G. Witherby, 326 High Holborn, W. C. England. Size 7½ x 10; 187 pages. Price 40 shillings.

This is an elaborate book with 132 photographs and diagrams covering a subject which has been somewhat neglected in the bound literature in the past few years. The author writes from a wealth of practical experience as past works manager of several large British tube manufacturing plants, and as a consultant in this field.

The subjects covered in detail in non-ferrous tubing are as follows: The Refinery or Foundry for Copper Billet Casting, Piercing of Non-ferrous Metals by Rotary and Extrusion Methods: Reheating Furnaces: The Brass Shell Casting Foundry; The Cold Drawing Process; Annealing and Pickling; Warehousing Stock Room, Tools, Testing and Inspection; Stock Taking; General Organization.

Government Publications

United States Government publications are available from the Superintendent of Documents, Government Printing Office, Washington, D. C., to whom proper remittance should be made to cover price where a charge is mentioned. In some cases, as indicated, apply to governmental body responsible for publication.

Metal and Fiber Flashlight Cases. Simplified Practice Recommendation R68-33. Price 5c.

Secondary Metals in 1933—Advance Summary. U. S. Bureau of Mines, Washington, D. C.

Gold in 1933—Advance Summary. U. S. Bureau of Mines, Washington, D. C.

The total gold production in the United States in 1933 amounted to 2,552,459.85 ounces, valued at $52,764,028 (based on the statutory value of $20.67+ per fine ounce) against 2,513,756.90 fine ounces in 1932, valued at $51,963,967 (at the same basic valuation per fine ounce). This represents an increase of 38,702.95 fine ounces and an increase of $800,061.

Shop Problems

This Department Will Answer Questions Relating to Shop Practice.

ASSOCIATE EDITORS

Metallurgical, Foundry, Rolling Mill, Mechanical Electroplating, Polishing, and Metal Finishing

H. M. ST. JOHN W. J. PETTIS O. J. SIZELOVE
W. J. REARDON W. B. FRANCIS WALTER FRAINE

Black on Die Castings

Q.—We have a customer who requires his product, a zinc base die casting, to be finished black. Do you know of any cheaper, easier and simpler process than copper striking and dipping in hot liver of sulphur solution?

A.—Use the following solution to produce a black finish on zinc base die castings:

Nickel chloride	4 oz.
Ammonium chloride	6 oz.
Sodium sulpho-cyanide	2 oz.
Zinc chloride	½ oz.
Water	1 gallon

Use the solution at a temperature of 100° F. and dip the work into the solution until the black color is produced. After blackening, rinse in clean cold water and oil with paraffine oil. —O. J. S. Problem 5,329.

Buffed Lacquer Name Plates

Q.—Please send us as soon as possible the correct procedure in finishing chrome plated and buffed lacquer name plates.

A.—There are two methods that can be used in producing the finish you desire.

One is to chrome plate the work and then apply the lacquer and the other is to apply the lacquer to the work and then chrome plate it.

If you will send us a sample of the finish you wish to produce we will be pleased to give you the exact procedure to use. —O. J. S. Problem 5,330.

Cadmium on Typewriter Bars

Q.—Enclosed please find 2 typewriter bars. I have a customer who has quite a few of them to be plated in a rust proof finish so as to bring out a nice clean white finish, possibly nickel or cadmium. As they are all either rusty of in a peeled condition, I would like to know if you could recommend a method by which I could obtain the desired finish without any polishing operation before plating them as they do not have to be bright.

A.—To refinish the typewriter bars in a cadmium plated finish, use the following procedure.

Use a hot solution of concentrated muriatic acid to remove the rust and then strip the nickel off in a solution of sulfuric and nitric acid. Use 2 parts of sulfuric acid and 1 part of nitric acid, cold.

USE THIS BLANK FOR SOLUTION ANALYSIS INFORMATION

Fill in all items if possible.

Date.....

Name and address: .....Employed by: .....

Kind of solution: .....Volume used: .....

Tank length: .....width: .....Solution depth: .....

Anode surface, sq. ft.:.....Cathode surface, sq. ft: .....

Distance between anode and cathode: .....Kind of anodes: .....

Class of work being plated: .....Original formula of solution:.....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible.

Use separate sheet if necessary. _____

_____

_____

_____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

After the nickel is removed use a hot solution of sodium cyanide (6 to 8 oz. of sodium cyanide to 1 gallon of water) to brighten the surface of the work and then cadmium plate.
—O. J. S., Problem 5,331.

Imitation Gold

Q.—We are desirous of obtaining a brass finish to imitate gold. We ask you to give us any information that you may have regarding this.

The article to be plated is made of high brass and there is soft soldering that has to be covered. We want this to be as near a gold as possible.

Also, if you know of any colored lacquer that we can use in place of plating, kindly advise us.

A.—To imitate a gold color on high brass we would suggest that you apply a gold dye lacquer to the work. For this material consult the lacquer manufacturers who advertise in **Metal Industry.**

It will be necessary to brass plate the work to cover the soft solder before using the gold dye lacquer.
—O. J. S. Problem 5,332.

Matte Silver on Dials

Q.—Do you have a book containing the formula for silver plating to obtain the frosted finish on silver watch dials? I am very much interested in getting this information. I can produce this finish with slow and low current, but the process I use takes so much time, it makes my services too expensive.

A.—The following formula will produce a matt finish upon watch dials:

Sodium bichromate	4 ozs.
Sulfuric acid	12 ozs.
Water	1 gallon

This solution is kept in a stoneware crock and used at room temperature. The work is cleaned, placed in the solution until the matt effect is produced, then rinsed in clean cold water, cyanide dipped, and silver plated.

After silver plating, place the work in boiling hot water for a few minutes to bleach the silver deposit so the deposit is a dead white color. —O. J. S. Problem 5,333.

Red Copper Compound

Q.—I wish to ask you if you have a formula for a copper plating solution made up with red copper compound or copper sulphite. Red copper compound is made by taking sulphate of copper or blue stone and precipitated with bisulphite of soda, and in cuprous sulphite.

I would appreciate if you give full information for a copper solution containing this chemical compound.

Can you give me information as to the best method for plating over iron or steel that has been copper plated and then nickel plated. It was then cut through by the buffer. I would like to get information of a method to plate right over the old plating so there will not be any stripping to be done. This work all gets chromium plated and the deposit must be good to stand buffing and chrome plating.

A.—At one time the red copper compound (cuprous sulphite) was used to a greater extent than it is today in making cyanide copper solutions. It was used in place of copper carbonate, and if you wish to make a cyanide copper solution from this compound, use the formula for a copper carbonate solution on page 11, 1932 **Platers' Guidebook.**

It is quite a difficult job to replate over a nickel deposit and have perfect adherence of the deposit when chrome plating.

We would recommend that the old deposit be stripped, and then plated. You might try cleaning thoroughly, then plate for few minutes in a cyanide copper solution, and remove the copper deposit by using a bright dip and then replate in cyanide copper until covered with copper and then plating in acid copper for thickness of copper deposit. Copper color, then clean, and nickel plate. —O. J. S., Problem 5,334.

Satin Finish on Brass

Q.—Would you be kind enough to tell me the best method to follow to produce the regular satin finish on small brass buckles similar to the enclosed.

A.—We would recommend the use of a matt dip to produce a satin finish on the samples submitted.

Formula for matt dip:

Sulfuric acid	1 gallon
Nitric acid	1 gallon
Zinc oxide	2 pounds

Operate hot and keep water from dip.

If the matt is too coarse, add sulfuric acid to the dip. If matt is too fine, add nitric acid to the dip. An excess of zinc oxide must be used in the dip. —O. J. S., Problem 5,335.

Stripping Gold and Etching Steel

Q.—Please advise us the best method or procedure to use in stripping gold off of plated articles. The gold plate is over a base of sheet brass.

Also, would you give us the best method of etching graduations on steel? The etched lines are to be approximately every sixteenth of an inch.

A.—Use the following solution for removing gold from the brass work:

Sodium cyanide	4 oz.
Copper cyanide	1 oz.
Potassium Ferrocyanide	8 oz.
Water	1 gallon

Operate the solution at 160° to 170° F. and use 2 to 3 volts. Use steel cathodes.

For etching steel use the following solution:

Nitric acid	30%
Water	70%

To each gallon of solution add 1 oz. of mercury nitrate.
—O. J. S., Problem 5,336.

Tin Plating

Q.—Please give us information on electro tin plating. Where I am employed, I am working on tin alone.

A.—For information on tin, we would refer you to the article entitled "An Efficient Electrotinning Process" by F. F. Oplinger, published in **Metal Industry,** December 1931, pages 529-32.

We have no extra copies of this issue in our files, but you can undoubtedly find them in your local library.—Ed.
Problem 5,337.

Carbon Molds

Q.—We would appreciate information on formula for making carbon molds.

A.—The way to make a carbon mold is to use a block of carbon and turn out the form you wish to cast in the same manner you would from a block of wood or steel.

Carbon blocks are made high grade 80 per cent lamp black and 20 per cent tar. To shape these carbon blocks special hydraulic presses are used together with special furnaces, etc.

There is no way you can mold carbon molds unless you go into the manufacture of carbon. The way to make these molds is to order a block of carbon the size you require and form the object to be produced as stated above.—W. J. R., Problem 5,338.

Patents

A Review of Current United States Patents of Interest

Printed copies of patents can be obtained for 10 cents each from the Commissioner of Patents, Washington, D. C.

1,961,751. June 5, 1934. **Gas Burner.** Per L. F. Feyling, Watertown, Mass.

1,961,752. June 5, 1934. **Process of Treating Metal and Alloy Articles to Improve the Resistivity Thereof to Corrosion and to the Product Thereof.** Colin G. Fink and Frederic J. Kenny, New York.

1,961,773. June 5, 1934. **Etching Machine.** William McKay, Los Angeles, Calif.

1,961,833. June 5, 1934. **Apparatus for Making Hollow Cables.** Horace A. Staples, Plainfield, N. J.

1,961,867. June 5, 1934. **Process for Degreasing Metallic Articles.** Joseph Savage, Runcorn, England.

1,961,941-2. June 5, 1934. **Die-Casting.** Charles Pack, Jackson Heights, N. Y.

1,962,132. June 12, 1934. **Organo Metallic Protective Agent.** Hamilton Bradshaw, Wilmington, Del.

1,962,339. June 12, 1934. **Process of Making Colored Metallic Article.** William J. Cotton, Buffalo, N. Y.

1,962,490-1. June 12, 1934. **Article and Method of Casting the Same.** Everett G. Fahlman, Cleveland, Ohio.

1,962,606. June 12, 1934. **Copper Beryllium Alloy.** Georg Masing, Berlin, and Waldemar Pocher, Berlin-Siemensstadt, Germany.

1,962,617. June 12, 1934. **Manufacture of Enamelware.** Jacob E. Rosenberg, Pittsburgh, Pa.

1,962,628. June 12, 1934. **Pressure Die-Casting Machine.** Karl Friedrich Wagner, Stuttgart, Germany.

1,962,631. June 12, 1934. **Separator.** Joseph William Winter, Penfield, Pa.

1,962,635. June 12, 1934. **Enameling Apparatus.** William T. Christman and Herbert Dean, McKees Rocks, Pa.

1,962,637. June 12, 1934. **Copper-Base Alloy.** Donald K. Crampton, Marion, and Henry L. Burghoff, Yalesville, Conn.

1,962,688. June 12, 1934. **Soldering Iron.** Frank Kuhn, Detroit, and Laurence H. Thomas, Birmingham, Mich.

1,962,821. June 12, 1934. **Cleaning Metal Surfaces.** Herbert W. Kochs, Chicago, Ill.

1,962,911. June 12, 1934. **Spray Gun.** Harold A. Roselund, Toledo, Ohio.

1,963,085. June 19, 1934. **Comminuted Alloy.** Arthur W. Gray, East Orange, N. J.

1,963,106. June 19, 1934. **Galvanizing Machine.** Frank W. Thompson, New Philadelphia, Ohio.

1,963,146-50. June 19, 1934. **Method of Casting Centrifugal Pipes.** Norman F. S. Russell and Frederick C. Langenberg, Edgewater Park, N. J.

1,963,253. June 19, 1934. **Manufacture of Abrasive Articles.** Frederick A. Upper, Niagara Falls, Ontario, Canada.

1,963,280. June 19, 1934. **Collapsible Tube Machine.** Walter Prussing, Brooklyn, N. Y.

1,963,363. June 19, 1934. **Plating Fixture.** Philip P. Hale, Toledo, Ohio.

1,963,391. June 19, 1934. **Electroplating Method.** Ralph J. Wirshing and Harry C. Mougey, Detroit, Mich.

1,963,604. June 19, 1934. **Coated Electrolytic Product.** Richard A. Wilkins, Beverly, Mass.

1,963,829. June 19, 1934. **Producing High Vacua.** Hugh S. Cooper, Cleveland, Ohio.

1,963,834. June 19, 1934. **Method of Ornamentation.** Hugh L. Decker, Toledo, Ohio.

1,963,893. June 19, 1934. **Process for the Production of Metals in a Finely Divided State.** Eugene Drouilly, Paris, France.

1,964,127. June 26, 1934. **Spray Gun.** Robert D. McIntosh, River Forest, Ill.

1,964,255. June 26, 1934. **Spray Gun.** Victor S. Faast, Los Angeles, Calif.

1,964,324. June 26, 1934. **Die Casting Machine.** Torbjorn C. Korsmo, Madison, Wis.

1,964,407. June 26, 1934. **Method and Apparatus for Making a Slit Flexible Tubing.** Walter E. Phillips, Cleveland Heights, Ohio.

1,964,474. **Method of Manufacturing Fittings.** David E. Lindquist, Port Huron, Mich.

1,964,584. June 26, 1934. **Method of and Apparatus for the Manufacture of Bearings.** William H. Klocke, Woodhaven, N. Y.

1,964,736. July 3, 1934. **Anode for Electroplating.** Harry Le Laurin and Albert L. Fry, Washington, D. C.

1,964,790. July 3, 1934. **Spray Coating Machine.** Wayne B. Roberts, Mount Lebanon, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,964,901. July 3, 1934. **Buffing Wheel, Buffing Wheel Fabric, and Method of Treating the Fabric.** Kenneth Homes Barnard, Andover, Mass., assignor to Pacific Mills, Lawrence, Mass.

1,964,948. July 3, 1934. **Process of Refining Hard Tin.** Walter R. Hibbard and Ellsworth T. Candee, Waterbury, Conn., assignors to The American Brass Company, Waterbury, Conn.

1,965,012. July 3, 1934. **Precious Metal Alloy Composition.** Norris O. Taylor, Minneapolis, Minn., assignor to Spyco Smelting and Refining Company, Minneapolis, Minn.

1,965,077. July 3, 1934. **Apparatus for Discharging and Loading Burnishing Barrels.** William R. Hartley, New Haven, Conn.

1,965,190. July 3, 1934. **Process for Refining Copper.** Philip M. Hulme and Frank X. Banz, Chuquicamata, Chile, assignors to Chile Exploration Company, New York, N. Y.

1,965,219. July 3, 1934. **Rolling Mill.** James R. Coe, Watertown, Conn., assignor to The American Brass Company, Waterbury, Conn.

1,965,251. July 3, 1934. **Electroplating Bath.** William S. Murray, Utica, and Daniel Gray, Sherrill, N. Y., assignors to Oneida Community, Limited, Oneida, N. Y.

1,965,269. July 3, 1934. **Method of Coloring Aluminum.** Martin Tosterud, Arnold, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,965,284. July 3, 1934. **Electroplating Machine.** Victor Finston and Constantine G. Miller, Cicero, Ill.

1,965,299. July 3, 1934. **Abrading and Polishing Composition.** Philip Alfred Patterson, Detroit, Mich., assignor to McAleer Manufacturing Company, Detroit, Mich.

1,965,340. July 3, 1934. **Apparatus for Handling Molten Metal.** Herbert M. E. Heinicke, Elgin, Ill., assignor to Western Electric Company, Incorporated, New York.

1,965,604. July 10, 1934. **Process for Improving Aluminum Alloy.** Alfred J. Lyon, Harshmanville, Ohio.

1,965,606. July 10, 1934. **Dynamo-Electric Machine Regulation.** William H. Powell, Wauwatosa, Wis., assignor to Allis-Chalmers Manufacturing Company, Milwaukee, Wis.

1,965,682. July 10, 1934. **Coating Aluminum.** Harold K. Work, Oakmont, Pa., assignor, by mesne assignments, to Aluminum Colors, Incorporated, Indianapolis, Ind.

1,965,683. July 10, 1934. **Coating Aluminum.** Harold K. Work, Oakmont, Pa., assignor, by mesne assignments, to Aluminum Colors, Incorporated, Indianapolis, Ind.

1,965,684. July 10, 1934. **Coating.** Harold K. Work, Oakmont, Pa., assignor to Aluminum Company of America, Pittsburgh, Pa.

1,965,759. July 10, 1934. **Flux for Galvanizing.** Allen T. Baldwin, Montclair, N. J., assignor, by mesne assignments, to Hanson-Van Winkle-Munning Company, Matawan, N. J.

1,965,760. July 10, 1934. **Flux Wash for Galvanizing.** Allen T. Baldwin, Montclair, N. J., assignor to Hanson-Van Winkle-Munning Company, Matawan, N. J.

1,965,928. July 10, 1934. **Method and Means for Melting and Refining Metals.** Alexander Grant McGregor, London, England.

1,966,194. July 10, 1934. **Grinding Machine.** George F. Yager, Toledo, Ohio, assignor to The Bunting Brass and Bronze Company, Toledo, Ohio.

1,966,203. July 10, 1934. **Method of and Material for Removing Soldering Fluxes.** James H. Gravell, Elkins Park, Pa., assignor to American Chemical Paint Company, Ambler, Pa.

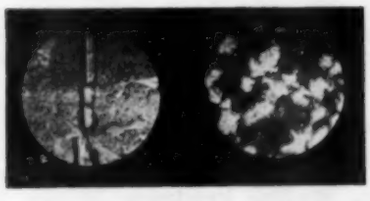
Equipment

New and Useful Devices, Metals, Machinery and Supplies

Alumiliting Automobile Pistons

THE latest step in the evolution of the aluminum alloy piston is Alumiliting—a process which forms a hard, smooth aluminum oxide surface as an integral part of the piston. This surface, it is said, has fine bearing qualities and materially increases the resistance of the piston to scuffing, thus lengthening the life of the piston and reducing cylinder wear.

Aluminum alloy pistons have for many years been standard equipment on the majority of American cars. The Aluminum Company of America, Pittsburgh, Pa., has developed an alloy known to the trade as Lo-Ex and also the T-slot piston design, in which the vertical slot does not extend to the bottom of the skirt. Their engineers next directed their efforts toward a harder surface for the piston. The Lo-Ex aluminum alloy pistons are electrolytically treated in large tanks; the equipment resembles that used for electroplating. If desired, the operation can be made fully automatic and continuous. Machining and grinding are done before treatment and the thickness of the Alumilite finish can be controlled uniformly and within close limits. The oxide surface is made out of the body of the metal; it is not a layer deposited on the surface. This accounts for the tenacity with which it adheres to the piston surface and the little change in diameter during the treating process.



a. b.

Microscratch in Lo-Ex Alloy Piston: (a) Untreated surface; (b) Alumilited Surface. The scratch in each case was made with a cubical diamond point loaded with three grams

The Alumilite finish, it is claimed has the hardness and smoothness of a fine bearing surface. In addition, it is said to contain innumerable invisible surface cavities which absorb oil.

Pistons with the Alumilite finish are available for replacement in many makes of automobile engines. The first cars to be factory-equipped with Alumilited pistons are among the leaders of the fine car field—Lincoln, Cadillac and LaSalle. This does not imply that the cost of Alumiliting is prohibitive, for it is not.

Pan Type Brass Mill Annealing Furnace, Electrically Heated

This furnace, made by the W. S. Rockwell Company, New York, is used for annealing straight long rods for coiled rod, brass, bronze, and for sheet metal also. It is specially recommended for accurate, low temperature work.

The furnace chamber is 5 ft. wide x 16'—10½" long inside. It accommodates a single pan at a time 4 ft. wide x 16 ft. long, which is withdrawn from the furnace by a pan puller which also pulls in a new loaded pan in the usual mill practice.

The door at each end is 20½ in. high at sides. This is made high enough for the coils. If straight rods alone are being annealed the doors need not be quite so high.

The output of the furnace is approximately one ton of annealed work per hour, not including the weight of the metal pan. The load per pan is approximately one ton. Annealing time about one hour to hour and a quarter.

Electrical consumption is approximately 140 k.w.h. per ton of work annealed at 1250 deg. F. Connected load, 260 k. w. at 220 v., 3 phase, 60 cycle. The connected load of this furnace is a little higher than normal for a furnace of this

Rockwell Pan Type Electric Furnace

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Roll Type Pyrometer for Taking Surface Temperatures of Revolving Rolls, Cylinders and Dryers. Illinois Testing Laboratories, Inc., Chicago, Ill.

Continuous Controlled Atmosphere Furnaces. Conveyor belt type furnace with conditioned atmosphere, suitable for annealing, silver soldering, copper brazing and scaleless hardening. W. S. Rockwell Company, 50 Church Street, New York.

New Volt Amp Adjuster for Electric Arc Welding Equipment. Hobart Brothers Company, Troy, Ohio.

Laytex. A new patented insulation for the electrical industry. U. S. Rubber Products, Inc., New York.

Krome-Alume. A new line of chromium processed aluminum ware for the restaurant, cafeteria and lunch room. Processed Metals Corporation, Lockport, N. Y.

Compensated or Differential Humidity Control System. Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

Belt-Conveyor Type Electric Furnace. For hardening or tempering miscellaneous moderate sized pieces. W. S. Rockwell Company, New York.

Steam Jet for Stainless Steel Pickling. For use in highly corrosive solutions, such as hydrofluoric, nitric or hydrochloric acids. Heil and Company, Cleveland, Ohio.

Air Clutch for Forging Machines. National Machinery Company, Tiffin, Ohio.

Foseco Plunger. For the introduction of alloys in molten metals. Foundry Services, Inc., New York.

Oxweld Cutting Machine (CM-8). Linde Air Products Company, New York.

New 75 Ampere Welder. Lincoln Electric Company, Cleveland, Ohio.

Electrolytic Iron Powder and Electrolytic Iron Sheets. National Radiator Corporation, Johnstown, Pa.

Pre-Mixt Ready-Mixed Acid and Water-Proof Cement and "Vitric-10" Quick-Setting Acid-Proof Cement. Covered by patents No. 1,973,732 and 1,973,731 on acid proof cements which are fast setting, chemical hardening acid proof, water proof, oil proof and steam proof. United States Stoneware Company, New York.

size and contemplated capacity because it is intended to be run during the night on a low off-peak power rate and it is purposely powered high so that it will come up to heat quickly from ½ to ¾ hr. after a 10 hr. shut down. The normal power rating would be between 200 and 225 k.w.

The furnace has two control zones, each covering half the length of the furnace. Each zone is 130 k.w.; 230 v.; 60 cycle; 3 phase. Approximately two-thirds of this power is located on the roof of the furnace. The remaining third is located under the floor of the annealing chamber.

The Lancaster Sand Mixing System

The Lancaster Iron Works, Inc., Lancaster, Pa., are manufacturers of mixing equipment, which operates under the counter current rapid batch mixing system. It consists of a mixing pan slowly rotating in an opposite direction from one or two rapidly rotating mixing stars. The pan serves as a conveyor and delivers a thin layer of material to the area covered by the tools of the mixing star. The center of the mixing star is eccentric with the center of the pan, thus subjecting every square inch of the pan to the mixing action. The mixing star can be fitted with flexible plows or with a combination of plows or kneading mullers. All mixing tools are adjustable. Fully enclosed, dust-proof units are also available in various sizes.

There is a "Lancaster" mixer for foundry sands which, it is stated, not only mixes but also aerates the sand. It is claimed that there is no packing or pressing of the sand by the muller action, but a fluffy product. This equipment, it is said, permits increasing the proportions of old sand, resulting in economies in the use of new material; it uniformly distributes moisture throughout the batch; uniformly distributes powdered binders; it accomplishes rapid and progressive reduction of nodules and lumps. In mixing core sands, it is claimed that there is a substantial reduction in the amount of oil used because of its intimate dispersement. The mixing time ranges from 2 to 6 minutes.

The Lancaster Mixer in Full Action

Protective Coverings for Metal

A protective covering called Protex, has been developed by the Apollo Metal Works of La Salle, Illinois.

It is sometimes found that forming tools scratch and mar the high surface reflectivity of nickel and chromium finished sheet metals. Manufacturers of small stamped parts, of washing machines, ice cream cabinets and restaurant equipment often find it difficult to handle large sheets of highly polished metal without damage. Protex it is claimed, overcomes these difficulties.

Protex is nothing more than a protective sheath which is temporarily affixed to sheet metals by a special compound. Although this protective sheath clings tenaciously while small parts are being formed from finished metals, it is said to be removable with ease after the necessary machine operations are performed. The lustre of the finished metal is said to be undiminished by handling.

It is said to be possible to make deeper draws when Protex is present, as the protective sheath permits the base metals to be drawn and yet the surface plate of nickel or chromium remains undistorted by the draw.

Heat-Resisting, Acid-Proof Stoneware

Rectangular plating tanks and cylindrical acid pots which are wanted to withstand high heat and sudden changes in temperature, can now be made in "Acitherm" heat-resisting and acid-proof stoneware. "Acitherm" is a new heat-resisting ceramic which has recently been developed by the Research Department of The United States Stoneware Company of 50 Church Street, New York City. It is claimed that there is no other heat-resisting and acid-proof stoneware on the market which even approaches "Acitherm" in its resistance to high heat, unusual thermal shocks and in corrosion-proof properties.

"Acitherm" stoneware occupies a position about halfway between chemical stoneware and fused silica ware. Its ultimate tensile strength is approximately 8,000 lbs. per sq. inch. Its ultimate compressive strength is approximately 118,000 lbs. per sq. inch. Its rupture modulus is 14,000 lbs. per sq. inch. The thermal conductivity is in two grades,—one, 7.5 B. T. U. per sq. ft. per degree F. per foot per hour and the other grade about twice as high.

"Acitherm" is said to be extremely hard so that grinding or finishing operations are done with difficulty. No glaze can be applied to this material. The size or shape of equipment which can be produced of "Acitherm" has no limitation, it is stated.

Ointment for Burns

A new healing ointment for burns of any kind and also for cyanide sores is manufactured by E. Wambaugh Company of Goshen, Ind. This ointment, called "I-Heal-U", which was originally in a liquid form is now in the form of an ointment with a lanolin base. All the ingredients which were formerly in the liquid state are now mixed in the ointment.

New Polishing Compounds

Harrison and Company, Haverhill, Mass., have developed several new compounds for cutting down and polishing stainless and carbon steel. The cutting compound, it is claimed, works fast and leaves a clean face with practically no material on the blade. The polish or mirror is said to give a black mirror finish and keeps the buff soft. The company will be glad to submit samples.

Tantalum Tubing

Siemens and Halske, Germany, have succeeded in producing seamless tantalum tubing, it is reported. The dimensions of the tubing are from 14 to 40 millimeters inside diameter and 0.5 to 2 millimeters in wall thickness. Thin tubes can be produced as long as one meter, and thicker tubes up to 3 meters. The tubes are also made with flanges or threads, or with one end sealed seamlessly. The report states also that this firm produces tantalum plated iron and copper tubes as well.

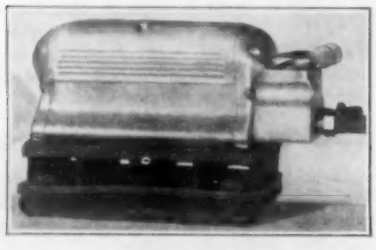
Wire Drawing Machines

A new upright cone wire drawing machine has been developed by the Waterbury Farrel Foundry and Machine Company, Ansonia, Conn., which was exhibited at the recent National Metal Congress, held in New York, October 1st-5th. Some of the special features claimed for this machine, which is designed for high speed, are given below:

1. Reciprocating die holders reduce wear on drawing drums.
2. Removable hardened steel drums and spacers.
3. Drawing cones are designed for a minimum slip saving power and wear.
4. Motor inside pedestal.
5. Push button to stop and start motor; jog button for stringing dies.
6. Swinging outer support for spool permits quick removal.
7. Constant speed belt contact drive for spool.
8. Tension segment to regulate tightness of wire on spool.
9. Adjustable for different size blocks.
10. Universally adjustable die holder. Clamp insures permanent location of die when set to cast properly.

New Sanding Machine Cuts Time

A unique sanding and polishing machine is being introduced by the Sterling Products Company of Detroit and Los Angeles. It weighs seven pounds, is only 7¼" long, 4¾" high and 3¾" wide, and operates on 70 pounds or more of compressed air, (using 6 cu. ft. of air per minute), thus making it suitable for small shops as well as the heaviest production lines.



Sterling Sander

The Sterling Speed-Bloc Sander operates on a principle not entirely new, but it is said to apply this principle most successfully. The sanding motion is an oscillating and reciprocal one. The stroke travel of the abrasive pad is one and one quarter inches, at the rate of between 2500 to 3000 oscillations per minute. The pad moves back and forth with the same motion as that used in hand sanding, eliminating the graining or chasing in the surface.

This sanding machine is also unusual in the pad device which carries the abrasive paper. This is made of rubber and felt, and is bridged in such a manner as to be fully flexible, thus making it applicable to convex or concave surfaces, along bouldings and in places difficult to sand, where the conventional sander cannot adapt itself. It is fitted with a water connection and can be used for wet sanding as well as dry sanding.

Time study data, it is claimed, have proven the machine capable of saving 50% to 80% in time required on spot jobs, and 50% to 60% in time required on line production, in relation to the hand method; also a saving of 10% to 20% in abrasives used.

New Type Portable Grinder

Chicago Wheel & Manufacturing Company, Chicago, Illinois, announces a new Portable Electric Grinder of the universal type which has a built-in air filter, effectively filtering all air entering the motor.

The new tool weighs four pounds, turns up 17,000 R.P.M., and has ample power to pull a wheel 2" in diameter. Motor housing, of heavy cast aluminum,

Portable Electric Grinder

extends out over the motor shaft and air filter, and is encased with an insulating cushion grip, giving positive control and operating flexibility. It is compact, well balanced, and with suitable grinding wheel or cutter inserted in the universal case-hardened chuck, will, it is stated, work at any angle and get into and around corners, irregular shaped holes and other hard to reach places.

The filter is of the viscous type and can easily be removed for cleaning and re-oiling. Tests running over a period of a year in various shops are said to have proven the air filter a most efficient protection for keeping all dust and abrasive matter out of the motor and bearings. Ventilation is in no way impaired even when the filter becomes extremely loaded with foreign matter.

Nickel Brightener

A new nickel brightener is being sold by E. Wambaugh Company, Goshen, Ind., called Nickel-Brite. It is stated that this addition agent can be used in any warm or cold nickel solution of standard formula, to produce a bright, lustrous deposit. The manufacturers claim that on small brass novelties and steel stampings which have a bright clean surface before plating, the color buffing and burnishing is entirely eliminated.

Nickel-Brite is recommended for conveyors, plating barrels or still tanks; one-half pint per 100 gallons of solution.

Standard Solutions

Fixanal is the name under which is produced definite quantities of reagents for preparing standard solutions. These preparations are supplied in hermetically sealed glass tubes either in solid form or in concentrated solution by J. D. Riedel —E. de Haen A.—G., Seelze, Hanover, Germany. The sole agents for the United States and Canada are Pfaltz and Bauer, Inc., 300 Pearl Street, New York.

Some of the chemicals which are supplied in this form are: sodium carbonate, suphuric acid, potassium hydroxide, sodium hydroxide, sodium chloride, hydrochloric acid, silver nitrate, potassium permanganate, potassium bichromate, sodium arsenite, nitric acid.

Continuous Electric Strip Annealing

Electric furnaces for the continuous annealing of nonferrous metal strip are made by Otto Junker, G.M.B.H., Lammersdorf (Kr. Monschau), Germany. The American agent for this type of furnace is F. W. Jaeger, 140 Liberty Street, New York.

Furnaces of this design are suitable for brass, copper and aluminum. The heat is generated through resistance coils of the "rim type." A heating element is used which is similar in appearance to a bicycle wheel rim, consisting of a profiled strip plate, several of which, set edge to edge, line the interior of the furnace wall. The cross section of a single element is similar to that of a curved wheel rim, and when several elements are aligned, they resemble a corrugated iron sheet. These heating resistors are capable of withstanding considerable mechanical stress, in spite of the comparative thinness of the material of which they are made. They can be designed, for example, in the form of arched girders, which are not only self-supporting, but able in addition to support the weight of the refractory material.

Some of the advantages claimed for this type of furnace are the following:

1. Economy in current consumption through the special construction of the thin walled muffle with imbedded heating spiral and powder insulation covering practically the whole furnace.
2. Careful division of the heat distribution in the length and width zone to enable an equal thorough annealing of the strips.
3. Careful handling of very bright strips which are easily marked on the surface, by using an automatic strip brake.
4. The strip is guided and flows freely even in the largest furnace, 50 ft. long. Stretching of the warm soft strip part is impossible.
5. Only with the continuous method is it possible to anneal a whole coil equally over the unreeled length of the strip. If the tight, wound up coil is annealed in a muffle furnace the annealing heat must first pass through the outer end of the coil causing thereby an excessive annealing of the coil end or an underannealing of the coil interior.
6. Another advantage of this short annealing is that the oxidation is slight and the pickling process is also very short.

New Maintenance Paint

A new flexible aluminum paint, which is said to give a scale-like metal sheathing for longer protection plus a smooth, brilliant finish, has recently been developed by the Roxalin Flexible Lacquer Co., 800 Magnolia Ave., Elizabeth, N. J.

It is claimed that dirt and dust do not attach themselves readily to the surface; because of excellent water-resistant qualities (including salt water) it stands washing beautifully; it also displays great resistance to chemical fumes, humid atmospheres, corrosion, rust, etc.

The one standard grade is recommended for indoors and outdoors. It is stated that one application covers stained and discolored surfaces completely with a brilliant metallic coat.

Degreasing Machines

The Blakeslee degreasing machines manufactured by G. S. Blakeslee and Company, Cicero Station, Chicago, Ill., use a solvent called Blacosolv. This type of machine was described in **Metal Industry** for January 1933, page 29.

The Blakeslee company has recently published a booklet describing their complete line and its applicability to a wide variety of metal products. It also includes information on methods of degreasing.

Catalogs

The Fallacy of Higher Wage Rates. A study of the relation of wage rates to productivity, by Allen W. Rucker, in collaboration with N. W. Pickering, President, Farrel Birmingham Company, Inc., Ansonia, Conn. (220)

Controlled Atmosphere Electric Furnaces. Annealing punchings and stampings, coiled strip, wire; brazing. General Electric Company, Schenectady, N. Y. (221)

"The Fiftieth Year" has just been published by the Harnischfeger Corporation of Milwaukee, Wis., in commemoration of the company's golden anniversary. (222)

General Specifications for Belted or Direct-Driven Types SA 300, SA 400, SA 600. Welders Specification Bulletin No. 303. Lincoln Electric Company, Cleveland, Ohio. (223)

Brown Thermometer Controller. A temperature controller that eliminates relays and open contacts. Brown Instrument Company, Phila., Pa. (224)

The Design, Installation and Service Advantages of Steel Mixture Furnace Linings and Arches. McLeod and Henry Company, Troy, N. Y. (225)

General Specifications for DC Motor Driven Types SA 300, SA 400 and SA 600 arc welders. Lincoln Electric Company, Cleveland, Ohio. (226)

Hills-McCanna (Saunders Patent) Valves with the Valve Body Made of U. S. Standard Chemical Stoneware. U. S. Stoneware Co., Akron, Ohio. (227)

Cooling and Condensing Coils. U. S. Stoneware Company, Akron, Ohio. (228)

Sand-Blast Cabinets. Bulletin No. 32. Type AT and Type AG. Ruemelin Mfg. Co., Milwaukee, Wis. (229)

Allen-Bradley Electrical Equipment. Sales terms and discount schedule; D. C. across-the-line starting switches; time limit D. C. automatic-starters; A. C. and D. C. drum reversing switches; multi-speed drum switches; non-reversing drum switches; controlling rheostats; portable compression rheostats; A. C. speed regulators; hand operated motor starting switches; hand operated A. C. starting switches; manual alternating current reversing switch; manual two speed across-the-line switch; semi-automatic resistance starter; A. C.-D. C. solenoid type contactors; A. C. magnetic contactors; A. C. reversing switches; A. C. across-the-line starting switches; single phase starting switches; A. C. combination starting switches; automatic across-the-line switches; high tension across-the-line starting switch; A. C. single phase resistance starters; automatic resistance starter; automatic transformer type starter; A. C. and D. C. control stations; Allen Bradley Co., Milwaukee, Wis. (230)

Galvannealed (Zinc Coated) Steel Sheets. Superior Sheet Steel Company, Canton, Ohio. (231)

American Quality Cold Rolled Strip Steel. Bulletin No. 3. American Steel and Wire Company, New York. (232)

Electric Heaters. Unit; enclosed; portable radiators. Harold E. Trent Company, Philadelphia, Pa. (233)

Ventilating, Heat, Cooling and Air Conditioning Equipment. Condensed catalog. I. L. G. Electric Ventilating Company, Chicago, Ill. (234)

Wire Dipping Baskets, Glazed Earthenware Dipping Baskets, Hard Rubber Acid Buckets and Dippers. Munning & Munning Inc., Newark, N. J. (235)

Plating Barrels, Insulating Joints, Tank Rheostats, Sawdust Boxes, Agitators. Munning & Munning, Inc., Newark, N. J. (236)

Carbon Arc Welding. Book on the practical methods of welding with the carbon arc. Hobart Brothers, Troy, Ohio. (237)

Norton Bortz (Diamond) Wheels for grinding and lapping cemented carbides. Norton Co., Worcester, Mass. (238)

Abrasives, Their History and Development. Norton Company, Worcester, Mass. (239)

Anti-Rust Anti-Freeze Denatured Alcohol. E. I. duPont de Nemours & Company, Inc., R & H Chemicals Dept., New York. (240)

Zerone-Anti-Rust-Anti-Freeze. E. I. duPont de Nemours & Co., Inc., R & H Chemicals Dept., New York. (241)

Quarterly Price List of Chemicals. E. I. duPont de Nemours & Company, Inc., R & H Chemicals Dept., New York. (242)

Precision Nut Tapper. National Machinery Company, Tiffin, Ohio. (243)

General Specifications for Engine Driven Type SA 300 Welder. Lincoln Electric Co., Cleveland, Ohio. (244)

Accounting Policies in Inter-Company Sales and Transfers. Policyholders Service Bureau, Metropolitan Life Insurance Company, N. Y. (245)

Lectro Process Molded Rubber Boots. Miller Products Co., New York. (246)

Anode Rubber Gloves. Miller Rubber Company, Akron, Ohio. (247)

Continuous Operating Air Filters. Northern Blower Company, Cleveland, Ohio. (248)

"The Problem". Taken from report of the Special Industrial Disease Committee of the Commonwealth of Massachusetts on the subject of Silicosis. Northern Blower Company, Cleveland, Ohio. (249)

Shaftless Motors. Louis Allis Company, Milwaukee, Wis. (250)

Unit Heater. Series 3. Fedders Manu-Manufacturing Company, Buffalo, N. Y. (251)

Industrial Cable. General Electric Company, Schenectady, N. Y. (252)

Type EC Dust Filter. Greatly simplified construction, reduced maintenance, increased filter cloth area. W. W. Sly Manufacturing Company, Cleveland, Ohio. (253)

Operating Manual for Plating with Duozinc. The zinc-mercury plating product and process for protecting steel surfaces against atmospheric corrosion. R & H Chemicals, Dept. E. I. DuPont de Nemours & Company, Inc., Wilmington, Del. (254)

Save time. Use the coupon below to get any of the above catalogs or bulletins, or for data on any subject not mentioned this month. METAL INDUSTRY will see that you get them promptly.

METAL INDUSTRY
116 John Street, New York.

(Insert below the number in parentheses at end of each item desired.)

I wish to receive the following bulletins mentioned in November .....

.....

I want information on the following equipment or materials also: .....

.....

Associations and Societies

American Electroplaters' Society

The 1935 Convention of the American Electroplaters' Society will be held at the Stratford Hotel, Bridgeport, Conn., June 10-13.

Connecticut Non-Ferrous Foundrymen's Association

The Connecticut Non-Ferrous Foundrymen's Association will hold a very unusual meeting on November 13th at the Garde Hotel, New Haven, Conn. The meeting will consist of a symposium on the influence of design on casting quality. Castings will be exhibited and slides will be shown.

The Copper and Brass Warehouse Distributors' Association

304 Hudson Street, New York

At a recent meeting of this organization, J. J. Whitehead, president, sounded the keynote, "One ideal for all, and all for one ideal." Addresses were made at this dinner and meeting by John A. Coe, president, American Brass Company, C. D. Dallas, president of Revere Copper and Brass, Inc.

Chicago Chapter, American Society for Metals

Care of K. H. Hobbie, 1140 W. Washington Blvd., Chicago, Ill.

The Chicago chapter of the American Society for Metals held its regular meeting on October 11th, 1934, in the Grand Ballroom of the Medinah Club. Mr. Stewart, engineer of the William D. Gibson Company, Chicago, gave a most interesting talk on the manufacture of springs. He touched upon new applications of various types of materials, non-ferrous as well as ferrous and also recently developed processes.

International Acetylene Association

Headquarters 30 E. 42nd Street, N. Y.

The International Acetylene Association will hold its 35th annual convention at the William Penn Hotel, Pittsburgh, Pa., November 14-16. Full details can be obtained from the secretary at the above address.

Philadelphia Branch, A.E.S.

The Philadelphia Branch of the A. E. S. will hold its Annual Meeting and Banquet on November 24th 1934, at Adam's, 13th and Spring Garden Sts.

A very good Educational Program has been arranged by Chairman Dr. A. K. Graham, of the U. of P. and the meeting will start promptly at 3 P. M. Papers will be read by Albert Hirsch, Dr. H. S. Lukens, G. Soderberg, Octavius Knight and Dr. Blum.

After the Educational session, the committee has arranged for a very good menu, good music and dancing. The banquet will start at 7 P. M.

Philadelphia Branch invites all its friends to make this Annual one of the good old times we used to have.

Banquet Tickets $2.50.

George Gehling, Chairman of the Committee.

Personals

Arnold Lenz Awarded Whiting Medal by American Foundrymen's Association

Arnold Lenz, who at the annual convention of the American Foundrymen's Association was awarded the Whiting Medal for his conspicuous contributions to the foundry industry, is a practical foundryman who worked his way up through the jobs of molder, coremaker, and melter, since he started out as an apprentice over 30 years ago. It is particularly fitting that at this convention, which was held in conjunction with the Fifth International Foundry Congress, the medal should be presented to a man who came to this country at the age of 18 from Germany, determined to make good in his adopted land. Mr. Lenz is now Assistant Manufacturing Manager in charge of the Flint, Bay City, and Saginaw plants of the Chevrolet Motor Company.

Born in Hauingen, Germany, in 1888, Arnold Lenz was apprenticed at the age of 14 to the firm of Sarsin, Staehlin & Co., Haagen. Displaying even in those early years the determination which has made him one of this country's foremost founders, he attended night school during the four years of his apprenticeship. When he came to America in 1906, he spent two years working his way through New York State Normal School at Fredonia, New York.

In 1908, Mr. Lenz entered the employ of the Browning Foundry Company, at Ravenna, Ohio, as molder. After working there as coremaker and melter, he became foreman for another company. From that time on, he was given more responsible positions with other foundries in the Ohio district. In May, 1916, he became an instructor in the foundry of the Buick Motor Company in Flint, Mich. That same year, he was promoted to general foundry foreman and then to assistant superintendent. After a year spent as assistant to the manager of the Aluminum Casting Company, in Detroit, he returned to General Motors Corporation as superintendent of their new gray iron foundry in Saginaw, then under construction. Since that time, he has held increasingly responsible positions with the General Motors Corporation, being today Assistant Manufacturing Manager in charge of the Flint, Bay City, and Saginaw plants of the Chevrolet Motor Company. He was recently elected President and Chairman of the Board of Regents of General Motors Institute.

ARNOLD LENZ

For his contributions to the development of the foundry industry, and especially for his work on the production of large quantities of automotive castings, Mr. Lenz was given the honorary degree of Doctor of Engineering by the University of Aachen, Germany, in 1933.

Dr. Walter S. Landis, vice president and director of the American Cyanamid Company, delivered the Joseph W. Richards Memorial Lecture at the 66th convention of the Electrochemical Society in New York September 28, 1934. The subject of the Lecture was Joseph W. Richards, The Teacher—The Industry.

L. O. Edelman has joined the sales force of the Frederick Gumm Chemical Company, Inc., 115 36th Street, Union City, N. J. Mr. Edelman will represent the above company in New Jersey and Pennsylvania.

Victor G. Vaughan, until June 1, 1934, manager of the Appliance Engineering Division of Westinghouse Electric and Manufacturing Company, is now associated with Spencer Thermostat Company of Attleboro, Mass., where he has charge of all operations including development of new products.

G. Byron Hogaboom, Jr., has established a commercial laboratory at 352 Mulberry Street, Newark, N. J., specializing in electrochemical work.

Obituaries

Charles R. Jacobs

Chas. R. Jacobs, 64, metallurgist and inventor and former associate of Charles Steinmetz died October 18th in Waterbury, Conn. Mr. Jacobs at the time of his death following a brief illness of pneumonia was associated with the American Brass Company, Waterbury, Conn. He had previously been associated with such firms as Dupont Company, General Electric Company, Norton Company and Crocker and Wheeler.

For many years Mr. Jacobs conducted his own laboratory in N. Y. City. He did considerable work in electrochemistry and metallurgy in collaboration with Mr. Steinmetz and Michael Pupin, noted electrical engineer. He was the inventor of Everdun and Alundum for which he was awarded the John Scott Medal in 1914 by the Franklin Institute of Philadelphia. He was also the recipient of the Louisiana Exposition Silver Medal in 1904 for outstanding work in metallurgy. Mr. Jacobs was a native of Lock Haven, Pa., a graduate of Lehigh College where he was a star athlete. He is survived by his wife, Mrs. Violet (McDowell) Jacobs; one son, Charles B. Jacobs, Jr., of Waterbury, one daughter, Miss Elizabeth M. Jacobs of New York City.

Louis Albert Jackes

Louis Albert Jackes, president of the Jones and Woodman Company, Newark, N. J., one of the country's largest firms of manufacturing jewelers, died October 21st at his home, 16 Madison Avenue, from a stroke.

Mr. Jackes was born in Newark, 58 years ago. His career in the jewelry business began when he was 14. After being with the Larter, Elcox Company of Newark for 2 years he went to the firm of Jones and Woodman in 1892 and upon the death of Mr. Woodman in 1932, succeeded him as president. During the World War, Mr. Jackes supervised the construction of a great number of air plane compasses manufactured by his firm for the U. S. Navy. He was a member of the Glen Ridge Country Club and the Glen Ridge Congregational Church and treasurer of the Shongum Fishing Club of Morris Plains, N. J.

Daniel B. Badger

Daniel B. Badger, 84 years of age, retired president of E. B. Badger and Sons Company, leading New England coppersmiths, died at his home, 12 Prospect Street, Winchester, Mass., recently following a brief illness.

Mr. Badger was connected with the firm which he long headed, for some 68 years. He was born in Boston and took an apprentice job in the plant in which he later became principal owner. At that time the firm was Hicks and Badger, with Erastus Badger in charge. In 1879 Daniel was taken into partnership and the name changed to E. B. Badger and Sons. In 1900 it was incorporated under the present name. At the time of his death he was chairman of the board. He is survived by his widow and three sons.

Elmer E. Arensberg

Elmer E. Arensberg, president, McCullough Dalzell Crucible Company, Pittsburgh, Pa., died at his home in that city on October 18th, aged 64 years.

Thomas J. Reid

Thomas J. Reid, who retired three years ago from the superintendency of the Aurora Foundry Company, Aurora, Ill., died recently at Irvington, N. J. Mr. Reid was 67 years old.

William A. Parker

William A. Parker, 69 years of age, founder and president of the Parker White Metal Company, Erie, Pa., manufacturer of material for the automobile industry, died at his home in Erie recently of pneumonia. He had been ill since January.

Henry Bergfels

Henry Bergfels founder of the Newark Nickel Plating Company and for 14 years president of the Masonic Veterans of Newark, died at his home, 9 Lehigh Avenue, of a heart ailment, October 22nd. He was 71 years old.

Mr. Bergfels was born in Newark and had long been active in local affairs. For 54 years he was president of the Newark Nickel Plating Company. He was a founder of the Newark Camera Club. For more than 35 years he was a member of St. John's Lodge, F. and A. M.

He is survived by his widow, a son Julius; a brother William Bergfels and four sisters.

Mrs. Charles H. Proctor

Mrs. Charles H. Proctor died on the morning of October 9th at her home in Arlington, N. J.

Mrs. Proctor, who had just returned with her husband, from a trip around the world, was taken ill on Monday, October 8th with what seemed to be acute indigestion. After some treatment she seemed to be recovering, but during the next morning her heart gave out and she passed away.

Metal Industry speaks for the entire electroplating fraternity in offering its heartfelt sympathy to Charles H. Proctor, for the loss of a life-long companion and helpmate.

Mrs. Hedley J. Richards

Mrs. Hedley J Richards passed away on October 11th. Her death was caused by Bright's disease. Mrs. Richards was well known to the members of the American Electroplaters' Society as she had always accompanied Hedley Richards to conventions of the Society, in which she took great pleasure.

The **Metal Industry** and the entire electroplating industry extend the hand of sympathy to their friend, Hedley Richards, for his great loss.

Industrial and Financial News

News of the Codes in the Metal Industry

ELECTRO-PLATING INDUSTRY

At a meeting of the supplementary code authority of the electroplating and metal polishing and metal finishing industry, held at the Stevens Hotel, Chicago, Ill., October 7th, 1934, the following were formally elected members of the supplementary code authority.

District I—**J. B. Esposito,** Oakland.

District II—**W. E. Carr,** San Antonio.

District III—**Wm. Shephard,** Racine Wis.

District IV—**E. A. Rottmann,** St. Louis, Mo.

District V—**H. C. Simmons,** Atlanta, Ga.

District VI—**R. J. Marshall,** Worcester, Mass.

District VII—**Philip Sievering Jr.,** New York.

District VIII—**F. F. Pierdon,** Washington, D. C.

District IX—**Albert Kriese,** Indianapolis, Ind.

District X—**Harold M. Karet,** Buffalo, N. Y.

District XI—**James E. Nagel,** Toledo.

District XII—**L. D. Jensen,** Chicago, Ill

Non-Member Representatives:

Edward Hodecker, Hodecker Brothers. Newark, N. J.

Arthur Lyons, Hugh Lyons and Company, Lansing, Mich.

The administration member has not yet been appointed.

The following officers were elected:

1. Chairman, **Leo D. Jensen,** Chicago.

2. Vice-chairman, **James J. Nagle, Sr.,** Toledo, Ohio.

3. Executive Secretary and Confidential Agent, **Hugh Booth,** Executive Secretary of the Institute, Detroit, Mich.

4. Treasurer, **M. M. Wise,** Detroit.

A discussion of the Amendment Plan for the administration of the Supplementary Code was held. It was decided to table this question and to proceed under the Supplementary Code as originally planned.

A budget was adopted. The basis of assessment passed is ½ of 1 per cent of the 1933 total volume of business as reported on the Federal income tax reports, with a minimum of $3.00 and a maximum of $35.00 per month.

The following committees were appointed:

Committee on Costs: Harold M. Karet, Chairman, Keystone Chromium Corporation, Buffalo, N. Y.; **Albert Kriese,** Adams Plating Company, Indianapolis, Ind.; **Henderson Bell,** Chromium Corporation of America, Cleveland, Ohio; **Chester McDowell,** Chicago Telephone Supply Company, Elkhart Ind.; **Louis Eckelman,** Pyrene Manufacturing Company, Newark, N. J.; **H. B. Wilson,** Plainville Electroplating Company, Plainville, Conn.; **R. Stricker,** Standard Plating Works, Cleveland, Ohio.

Committee on Trade Practices: E. J. Musick, Musick Plating Works, Inc., St. Louis, Mo., Chairman; **C. T. Campbell,** Boston Nickel Plating Company, Boston, Mass.; **Robert Steuernagle,** S. K. Williams Company, Milwaukee, Wis.

Committee on Standards of Quality: M. M. Wise Parker-Wolverine, Detroit, Mich.; **Henderson Bell,** Chromium Corporation of America, Cleveland, Ohio; **C. S. Slack,** Detroit Plating Industries, Detroit, Mich.; **R. J. Nicholson,** B. Mercil and Sons Plating Company, Chicago, Ill.; R. A. Tonon, Rust Proofing Company, Cambridge, Mass.; **J. E. Nagle,** Jas. E. Nagle and Sons, Toledo, Ohio.

Committee on Health and Safety: R. J. Nicholson, B. Mercil and Sons Plating Company, Chicago, Ill.,Chairman; **J. O. Wagner,** Wagner Rust Proofing Company, Cleveland, Ohio; **A. A. Shephard,** A. A. Shephard Plating Company, Racine, Wis.; **J. Nook,** Kalamazoo Plating Works, Kalamazoo, Mich., **A. B. Karet,** Keystone Chromium Corporation, New York.

Committee on Standard Forms of Quotations and Contracts: P. H. Oleson, The Meaker Company, Chicago, Ill., Chairman; **A. R. Tonon,** Rust Proofing Company, Cambridge, Mass.; **J. N. Kelly,** Kelly Plating Company, Cleveland.

The Supplementary Code Authority passed a resolution authorizing each Industry Member of the Supplementary Code Authority to call a meeting of the members of the industry within his district for the purpose of electing a District Code Committee, in accordance with Article IV, Section 7, Sub-section (h) of the Code, the District Code Committee to be not less than three nor more than seven in number; meeting for the election to be called within 30 days; member of the Supplementary Code Authority for the District to be a member ex officio of the District Code Committee. District Code Committees which are subject to review by Administrator will begin to function in accordance with the Rules of Procedure for Handling Complaints proposed by the Supplementary Code Authority upon approval by the Administrator.

At a meeting of the Board of Governors of the Master Electro-Platers' Institute, reports were presented by the various committees on: Specifications (M. M. Wise, chairman); Costs, (H. Karet, chairman); Education, (C. Kloos, chairman); Membership, (H. Booth, in behalf of R. J. O'Connor, chairman).

The dues of the Institute will be the same as now existing until the approval by the N.R.A. of the budget of the Supplementary Code Authority. At that time the dues will be reduced to the minimum of $1.00 per month per member until May 31st, 1935. Membership fees will be suspended until January 1st, 1935, and then resumed at $5.00.

The bulletin will be continued and will be sent to all members of the industry until the Code Authority budget is approved. After that, the Bulletin will be mailed only to members of the Institute in good standing.

NON-FERROUS FOUNDRY INDUSTRY

The First Annual National Convention of the Non-Ferrous Foundry Industry was held September 19-21. Present in Chicago were representatives from all section of the country, from New York to California.

The first of these meetings was given over to the Cost Estimating and Accounting System. Minor changes were made after being freely discussed and considered by all those present. (For the draft of the proposed system see **Metal Industry,** September, 1934, p. 297-301 and October, 1934, p. 343-5).

The second open meeting discussed and considered the Proposed Trade Customs and Uniform Terms of Payment. Changes were made and it was decided that these Customs should be considered as a "Code of Ethics" for the Industry.

The proposed Classification of Castings as to Weight and as to Intricacy was discussed in detail and was referred back to the Committee for further study and work.

The meeting of the Members of the Miscellaneous Sand Casting Division, held on the afternoon of the second day considered and acted upon the subjects of the open meetings.

They adopted the Cost Estimating System with the minor changes. This system now will be submitted to Washington and when approved, will become the standard cost system of the Industry.

They also passed the Proposed Trade Customs and Uniform Terms of Payment.

The Dinner Meeting the second evening climaxed the work of the two days.

An address on "NRA Today and To Come" was given by W. A. Janssen, Deputy Administrator of the National Recovery Administration, Washington, D. C. This excellent talk by this interesting and capable speaker was eagerly listened to by all present.

At the business meeting following this talk, the various reports were presented by the President, the Secretary and the Treasurer.

N. K. B. Patch and A. B. Norton were elected President and Vice President respectively for the ensuing year

The meetings were well attended and the discussions were keen and intelligent. The spirit of co-operation and help pervading all those present was one of the entangible values received. The actions taken on the tangible items will have far reaching and definite results on each and every Member of the Non-Ferrous Foundry Industry.

Since the meeting the Code Authority Budget and Basis of Assessment has been approved by the National Industrial Recovery Board and every member of the Industry as defined in the Code must now pay his proportionate share of the expenses of Code Administration since the effective date of the Code.

ALUMINUM

The Code of the Aluminum Industry which was originally approved on June 26, for a 90-day trial period, was extended for another 90 days in order to allow sufficient time for the Code Authority to investigate past practices of the industry and any modifications of such practices or the effect on such practices resulting from the provisions of the Code.

SECONDARY ALUMINUM INDUSTRY

The National Recovery Administration announced recognition of the trade practice complaints committees for the secondary aluminum industry: **W. M. Weil,** National Smelting Co., Cleveland, O.; **W. A. McKnight,** William F. Jobbins, Inc., Aurora, Ill.; **D. K. Ewing,** Aurora Refining Company, Aurora, Ill.; Administration member, Deputy Administrator, **W. A. Janssen,** Washington; **J. B. Neiman,** Federated Metals Corporation, Detroit; **W. S. Singer,** Apex Smelting Company, Chicago.

DIE CASTING INDUSTRY

The Code Authority has made application to the National Industrial Recovery Board for the approval of a uniform cost accounting system. Copies of that system are available on request at the office of the National Recovery Administration, Room 404 Department of Commerce Building, Washington, D. C., and also at the Code Authority Office, 505 Arch Street, Philadelphia, Pa.

Francis Lee has been appointed Administration member of the Code Authority to serve during the pleasure of the Board.

JOB GALVANIZING METAL COATING

The following have been approved as members of the Trade Practice Complaint Committee: **J. P. Cattie,** Joseph P. Cattie Bros., Philadelphia, Pa.; **C. S. Whitney,** Dover Stamping and Manufacturing Company, Cambridge, Mass., and **F. B. Auxer,** National Telephone and Supply Company, Cleveland, Ohio, all members of the Code Authority.

FLEXIBLE METAL HOSE AND TUBING

The following have been approved as members of the trade practice complaint committee: **S. H. Collum,** Pennsylvania Flexible Metallic Tubing Company, Philadelphia, Pa.; **C. S. Hungerford,** American Metal Hose Company, Waterbury, Conn.; **J. F. P. Farrar,** Chicago Tubing and Braiding Company, Maywood, Ill.; **M. H. Joseph,** United Metal Hose Company, New York City; **C. W. Fletcher,** Titeflex Metal Hose Company, Newark, N. J., and **J. J. Young,** New York Gas Tubing Company, New York City.

METAL DECORATING

The Metal Decorating Division of the Fabricated Metal Products Industry has submitted a proposed Trade Practice Appendix to the industry's code for approval by the National Industrial Recovery Board. A divisional governing body will be set up with powers delegated by the Code Authority. Among the trade practice rules will be open price filing, optional system of cost accounting and a new schedule of discounts. Labor provisions (wages and hours) will be the same as in the basic code of the Fabricated Metal Products Industry.

Earnings of Companies

Net profit unless followed by (L) which is loss.

	9 months 1934	9 months 1933
Scovill Manufacturing Company (7 months)	$ 493,426	$ 242,063 (Full year)
Bohn Aluminum and Brass Corporation	1,263,465	1,159,229
Bohn Aluminum and Brass Corporation (Third quarter)	125,437	549,325
General Electric Company	11,714,247	6,886,600
Yale & Towne Manufacturing Company	8,256(L)	161,791(L)
Yale & Towne Manufacturing Company (Third quarter)	70,521(L)	27,626
Parker Rust Proof Company	696,654	480,245
Parker Rust Proof Company (Third quarter)	146,427	204,896
Reynolds Metals Company	1,330,077	1,062,103
Revere Copper & Brass, Inc.	989,817	180,642
Revere Copper & Brass, Inc. (Third quarter)	21,240	405,032
Savage Arms Corporation	10,345(L)	186,747(L)
Anaconda Wire & Cable Co.	780,097	302,297
Westinghouse Elec. & Mfg. Co.	363,787(L)	7,083,641(L)
Westinghouse Elec. & Mfg. Co. (Third quarter)	332,062(L)	1,513,645(L)
International Silver Co.	364,650(L)	262,905(L)
International Silver Co. (Third quarter)	381,142(L)	149,745
General Cable Corporation	161,051(L)	1,892,979(L)
General Cable Corporation (Third quarter)	78,956	304,513(L)

Metal Developments

Seal of Quality galvanized (hot zinc coated sheets) will be manufactured by the Columbia Steel Company, San Francisco, Calif., and a campaign started for the greater use of heavy coated galvanized roofing in the West Coast territory. Licenses to produce Seal of Quality sheets have now been issued to fourteen of the largest steel companies in the country.

Aluminum is now being used for printing ink according to a report in the Aluminum News-Letter. It has a very distinctive appearance, offering a really new type of color for printing.

At the recent **Industrial Arts Exposition** in Waterbury, Conn., **Anaconda** products manufactured by the **American Brass Company** had a prominent place. The American Brass articles displayed were chosen to illustrate the fundamentals of art as applied to industrial and engineering design by the use of fabricated parts, such as extruded brass, braided flexible metal tubing, etc.

The **National Bureau of Standards** in Washington is gathering information on industrial and engineering uses of silver, existing and possible. This research is being sponsored by a group of American silver producers. Among the fields which seem to have possibilities is the chemical industry in which silver lined equipment may be used for corrosion resistance; also the food industries for protection against contamination of the food products.

The **streamline train, M-10,001,** which is made largely of special high strength aluminum alloys, broke all records on its run from Los Angeles to New York, making this distance of about 3,300 miles in less than 57 hours elapsed time.

Aluminum is now being used in the form of foil to cap milk bottles, by the Sanitary Metal Cap Corporation of Syracuse, N. Y.

Copper materials for brewing industry will be shown by the I. C. I. Metals Ltd., of London, England, at the Brewers' Exhibition, which will be held in that city. The I. C. I. Metals Ltd., is also using a special copper welding process called Premag.

Aluminum will be used to coat the 200-inch mirror which will be used in connection with the world's largest astronomical telescope, recently cast by the Corning Glass Works. According to an article in the New York Times for Sunday, October 14th, by Waldemar Kaempffert, aluminum will be used instead of silver because it has a better over-all reflectivity. It will be deposited by a process invented by the late Thomas A. Edison, about 40 years ago, heating metal almost to the melting point in a high vacuum, at which point the metal evaporates and then condenses on the cold surface of the mirror. The article also contains an interesting description of the principles of coating mirrors with chromium.

Cadmium is a member of Commander Byrd's Expedition in the frozen South. In an article in the Dupont Magazine by C. M. Hoff is a description of the various types of the equipment used by this expedition, many parts of which are protected by cadmium plate which is well suited to withstand the most extreme weather conditions of that region.

The **Bohn Aluminum and Brass Corporation,** Detroit, Mich., has developed a process for the manufacture of aluminum from alunite ore with potash as a by-product. Press reports state that the project involves an investment of between $10,000,000 to $15,000,000. No details of the process are available.

An exhibition of **Contemporary American Industrial Art** opened on November 9th at the Metropolitan Museum of Art, New York. According to an announcement by Richard F. Bach in the bulletin of that Museum, collaborating designers and manufacturers numbered over 200 in all fields. The exhibition will consist of industrial products, such as household equipment, etc.

Beryllium is still moving ahead. The Beryllium Products Corporation of New York states that an alloy of nickel and beryllium can be tempered by precipitation hardening to a tensile strength of about 259,000 pounds per square inch, a yield point of 219,000 pounds with an elongation of 8 per cent and a Brinell hardness of 460. An alloy of beryllium with nickel and chromium developed 216,000 pounds tensile, 204,000 pounds elastic limit and 11 per cent elongation. These new alloys are rather higher priced than beryllium copper but they have extraordinary resistance to mineral acids at higher temperatures.

Nickel will be used in considerable quantities in the new 1 mark nickel coils issued in Germany, to replace her 1 and 3 mark silver coins, which are being withdrawn. An estimate recently published states that this replacement will bring back 640 metric tons of silver and 3160 tons of copper, and require 12000 tons of nickel.

Tantalum sheets, 0.005" thick can now be welded by the electric arc, according to a report from the Lincoln Electric Company, Cleveland, Ohio.

Magnesium has been featured in the daily press. According to a preliminary announcement from Johns Hopkins University, all that is needed for a kind heart is a small dosage of magnesium in the regular diet. Lack of magnesium produces nervousness and irritation. According to Professor E. B. McCullum, "You cannot have sweet disposition without magnesium, but that does not prove that you will have one when you take plenty." Gulping magnesium by the spoonful may result only in putting the gulper to sleep.

Even that may be the way out of your trouble. We would certainly prefer to see a great many of our crabbed acquaintances put to sleep. It would improve the general atmosphere. We recommend full speed ahead on this research.

The **American Zinc Institute** has submitted a statement in reference to the pending trade agreement negotiations with Belgium with the Committee for Reciprocity Information, United States Tariff Commission, Washington, D. C. This statement strongly opposes lowering the tariff on zinc products.

Industrial Materials Exhibit

The exhibition of Industrial Materials was held in the Park Central Hotel, New York, October 15-19 inclusive at which a number of very interesting exhibits were shown by concerns directly or indirectly engaged in the nonferrous metal manufacturing lines.

Below are details of these exhibits.

American Hard Rubber Company, New York. Ace products of hard rubber possessing special characteristics like electrical resistance, chemical inertness, strength, hardness, etc.

Apollo Metal Works, La Salle, Ill. Pre-finished metal using chromium, nickel, brass and copper finishes for tarnish resistance. A specially interesting item was their kitchen equipment made in chromium plated copper.

Bakelite Corporation, Bound Brook, N. J. A lecture accompanied by tests and samples illustrating new products, making possible numerous applications in a wide variety of industries.

Eclipse Air Brush Company, Newark, N. J. Low pressure paint spraying equipment for maintenance, painting and production finishing; portable and stationary installations.

Maas and Waldstein Company, Newark, N. J. Clear wood and metal lacquers, lacquer enamels, synthetic enamels, etc. Also **Synpex** a combination lacquer and synthetic enamel which is said to have the toughness, gloss and building qualities of synthetic enamels and quick drying properties of lacquer enamels.

Mt. Vernon Die Casting Corporation, Mt. Vernon, N. Y. Die cast parts for a wide variety of industrial equipment and metal products.

National Business Show

The 31st annual business show was held at the Port Authority Building, New York, October 15-20. As usual this aggregation of office equipment and machinery showed that the manufacturers recognize the value of appearance as well as efficiency in operation, the machines being attractively finished with durable but attractive electroplates and coatings.

Also a large part of the mechanism, including the housings of the machines, were made of non-ferrous alloys such as sheet brass, die castings, etc.

Among the types of equipment shown were the following: accounting scales; accounting equipment; adding and calculating machines; addressing machines; automatic feed devices; automatic typewriters; banking machines; binders and binding devices; bookkeeping and billing machines; burglar alarms; cash registers; check protecting and writing machines; check signers; clocks and communicating systems and equipment; computing scales; cost recording machines; counting machines; desks, desk trays and chairs; dictating machines; drinking water equipment; duplicating and printing machines; electric clocks; electric timing systems; electric typewriters; embossing machines; envelope sealing machines; filing cabinets and devices; fire alarm systems; folding machines; letter sealing machines; numbering machines; portable adding and calculating machines; portable typewriters; scales—portable and stationary.

Business Items-Verified

The Hauck Manufacturing Company, Brooklyn, N. Y., recently purchased the assets and good will of the oil burner division of Mead-Morrison Manufacturing Company, Boston, Mass. This company operates a brass machine shop and tinning department.

Kraeuter and Company, Inc., 583 Eighteenth Avenue, Newark, N. J., manufacturer of tools, motor car heaters, etc. has recently organized Kraeuter and Company of Canada, Ltd., to operate branch plant at 103 Church Street, Toronto.

Canadian Industries, Ltd., Beaver Hall Hill, Montreal, Canada, manufacturer of industrial chemicals, etc., has let general contract for a one-story addition. Cost close to $100,000 with equipment.

Motor Products Corporation, 11801 Mack Avenue, Detroit, Mich., manufacturer of automotive equipment has let general contract for a one and two-story addition, 60 x 200 ft., for storage and distribution. Cost about $50,000 with equipment.

Revere Copper and Brass, Inc., New York, announces the opening of an office at 804 Tower Petroleum Building, 1905 Elm Street, Dallas, Texas. **W. Russell Weil,** Southwestern District Manager will be in charge.

The Detroit office of the development and research department of **The International Nickel Company, Inc.,** moved on November 1st into larger quarters in the General Motors Building. E. J. Hergenroether is district representative.

American Brakebloc Corporation, 4660 Merritt Avenue, Detroit, Mich., has let contract for a two-story addition, at a cost of $100,000 without machinery. The company manufactures automotive equipment and is a subsidiary of American Brake Shoe and Foundry Company of New York. The firm operates a tool room and grinding room.

E. Reed Burns Manufacturing Corporation 21-27 Jackson Street, Brooklyn, N. Y., announces the appointment of two new sales representatives—Stanley M. Goodman, 709 Everson Bldg., Syracuse, N. Y., will cover the entire state of N. Y., except the Metropolitan District, while R. D. Tuttle, 2832 E. Gd. Boulevard, Detroit, Mich., will have as his territory, the State of Michigan.

Rich Manufacturing Company, Ltd., 3851 Santa Fe Avenue, Los Angeles, Calif., has let contract under which the company will manufacture complete line of electrodes and other products made by Karl Strobel Corporation. This firm operates the following departments: brass, bronze and aluminum foundry; brass machine shop, tool room, casting shop.

Harrison and Company, Haverhill, Mass., have been appointed sole distributors in New England States and New York, for **Iding's** cement and thinner. This material is used in place of glue for setting up wheels.

Superior Zinc Corporation, Philadelphia, Pa., recently adopted a $68,000

group life insurance policy for the protection of 59 employees, insuring each in amounts ranging from $1,000 to $2,500, according to rank. The policy was issued by the Prudential Insurance Company of America on the contributory basis, the employees paying a part of the premium and the employing company assuming the remainder of the expense.

Wilbur B. Driver, president of **Gilby Wire Company,** Newark, N. J., announced upon his return from Europe, the establishment of a new French Company to take over the European business of the Newark Company. The new company, known as **Gilby Wire Societe Anonyme** with the main office at 11 bis Rue d'Aguesseau, Paris, and plant at 76 Boulevard Richard Wallace, Puteau, France, commenced business on September 1, 1934. **Gabriel Fodor** formerly European manager of the Gilby Wire Company, Newark, will direct the affairs of the new company.

Scovill Manufacturing Company has offered a block of $8,000,000 fifteen-year, 5½% convertible debentures to the public through Kidder, Peabody and Company. These debentures represent the securities received from former stockholders of A. Schrader and Sons Company, Brooklyn, N. Y., in exchange for their stock when that company was acquired by Scovill in 1930. The debentures were originally issued to the amount of $21,147,500 but the oustanding total has been reduced to $13,530,000 by repurchase and retirement.

News From Metal Industry Correspondents

New England States

Waterbury, Connecticut

November 1, 1934.

All local brass concerns had extensive exhibits at the **Industrial Arts Exhibition** held here last month. Among the **American Brass Company's** exhibits were extruded brass pinion rods, flexible metal tubing with delicate surface ornamentation, and various manufactured articles. The **Scovill Manufacturing Company** showed vacuum cleaners, toilet articles, kitchen utensils, etc. The **Chase Companies** had a display of gift ware including sugar and creamers, trays and bowls. The **Beardsley & Wolcott Co.** showed electric toasters, flatirons, waffle irons, and percolators. The **Patent Button Company,** which celebrated its 100th anniversary last month, had an elaborate display of metal buttons.

Scovill Manufacturing Company last month put $8,000,000 in convertible bonds on the market to use to retire debentures issued to former owners of the **Schrader Company** when the latter concern was taken over. All were taken very quickly.

A financial report of that company shows a net profit for the seven months ending July 31 of $493,426 after deduction for depreciation, amortization, interest, federal income taxes and a reserve of $32,232 to reduce inventory valuation to less than cost and market value. This compares with a net profit of $305,689 for the entire last year and with a deficit of $1,322,933 for 1932. The net profit in 1931 was less than $160,000 and the net profit in 1934 was $506,618. The company now maintains four laboratories, one for routine work and three for experimental research and makes more than 11,000 tests weekly.

Industrial Properties Company has sold the old **Novelty Manufacturing Company,** recently owned by the **Beardsley & Wolcott Company,** to the **Lee Handbag Company** which will begin operations shortly with 50 workers.

The **Case** shop of the **Waterbury Clock Company** has been leased to the **Connecticut Supply Company,** dealers in mason materials and contractors equipment.

The **Waterbury Clock Company** now has nearly 2,700 persons working on Christmas orders, compared with a force of 1,200 a few monhs ago. Officials say the work on hand is no more than normal for this time of the year.

The **Chase Companies** have announced a wage reduction of 10 per cent affecting all salaried employees. It gives as the reason that the normal seasonal advance did not occur. The company is doing considerable business in its new line of lighting fixtures, the first architecturally designed line.

The **Waterbury Button Company** is using plastic materials to a considerable extent in the manufacture of lighting fixtures. It has been using them in the manufacture of buttons for a long time although it also manufactures large quantities of metal buttons.

John H. Goss, vice president of the **Scovill Manufacturing Company,** addressing the Men's Club of Mill Plain church last month expressed approval of Section 7-a of the National Industrial Recovery Act. He said that one of the worth while features of the NRA has been that it has eliminated some of the "bad boys" who were responsible for cutthroat competition. He expressed the belief that the proper operation of the NRA has been hindered by selfish persons seeking their own advantage at the expense of the rest.—W. R. B.

Connecticut Notes

November 1, 1934.

HARTFORD—The Underwood-Elliot Fisher Company reports earnings for the third quarter were slightly less than the same for 1933, with an increase in depreciation and federal income tax charged of about $100,000. The net profit for the quarter was $458,046 equivalent, after dividends on 7 per cent preferred, to 61 cents a share on the common. For the same period last year it was 73 cents a share on the common. For the three quarters this year the net was $1,850,137 after charges.

A new **Wasp** aircraft motor with a sea level rating of 800 horsepower, double that of the earliest motors of the company, has been produced by the **Pratt & Whitney Aircraft Company.** Pratt & Whitney engines and Hamilton Standard controllable pitch propellers, produced at the local factories of these concerns, had a prominent place in the **MacRobertson International Trophy** air race from London to Melbourne, Australia last month. Of the 21 planes entered, 4 were equipped with the local engines. The United States entry, the Boeing had the Hamilton Standard Pitch propeller.

The **Royal Typewriter Company** is advancing the price of standard typewriters from $105 to $110 owing to the increased prices for materials. This is the first advance in 60 years. Reductions will be made in trade allowances. Prices for portables remain unchanged but increases are expected.

The **Arrow-Hart & Hegeman Electric Company** paid the regular quarterly dividend of $1.62½ a share on the preferred and 10 cents a share on the common, Oct. 1.

The **Colt's Firearms Company** has organized a Federal Credit Union among its employees, the first in this state. There are 14 incorporators, all employees. **Herbert Walker,** personnel manager of the company, and secretary and treasurer of the credit union, had a prominent part in the organization.

TORRINGTON—The total production of local manufacturing plants during 1933 was $14,220,740, according to the Department of Commerce's census of manufacturers. Wages paid during the year amounted to $3,997,837 and materials, fuel and electric energy to $5,258,108. The average number of wage earners was 4,858 compared with 4,780 in 1931.

THOMASTON—The **Seth Thomas Clock Company** is having its seasonal upturn in business and expectations are that buying will continue for another month. Conditions are greatly improved over a year ago, liquidation of inventories in progress then has been completed and the demand for cheap clocks has decreased as buyers are ready to pay for better products. The company is now producing the movement mechansism required in measuring devices used by **Capt. Settle** in his stratosphere ascent, metronomes for measuring time in musical training and movements required in fire boxes. Its movements were used in clocks of both **Admiral Byrd** expeditions and a clock left after the first expedition at Little America was started on the second trip.

NORWALK—Segal Lock Company,

and its affiliate, the **Norwalk Lock Company,** have been granted loans to the amount of $157,500 by the RFC which will be employed in the purchase of materials, according to president **Edward Segal.**

NEW HAVEN—The **Winchester Repeating Arms Company** has received an order for 400,000 blank cartridges from the war department.

MIDDLETOWN—The **Remington-Noiseless Company** will erect a factory addition 60 by 120 feet, one story high at its local plant.

NEW LONDON—The **Electric Boat Corporation** has executed its contracts with the Navy for construction of three new submarines and has ordered hull material for them. Work on two submarines previously ordered now progressed so that they are about 60 per cent complete. Their launching will take place in the spring. The cost of the three new ones is over $7,000,000.

—W. R. B.

Providence, R. I.

November 1, 1934.

Charles L. Rhodes, indentified with the **Cathedral Art Metal Company** of Providence a member of the firm of **Glines & Rhodes** of North Attleboro, died September 20 at his home in North Attleboro. He was in his 65th year and is survived by his wife and one son.

The **Mayfield Jewelry Company, Inc.,** of Providence has been incorporated under the laws of Rhode Island with an authorized capital stock consisting of 100 shares of common stock of no par value. The incorporators are: **Thomas J. Paulino, Harold C. Arcaro and R. M. Fiore.**

Hyman Lisker, Eugene J. Sullivan and M. Leohning are the incorporators of the **Providence Ornament Company, Inc.,** chartered to conduct a manufacturing jewelry business in Providence with an authorized capital consisting of four shares of stock of no par value.

The **Cole Jewelry Manufacturing Company,** 220 Eddy street, is owned by **Harry B. Cohen,** of 28 Quint street, Boston, according to his statement of ownership filed at the City Hall.

The regular monthly meeting of the **Metal Finding Manufacturers' Association** was held October 3 at Narragansett Hotel. Following luncheon a brief business session was held under the direction of President **Frederick A. Ballou, Jr.,** discussions relative to the NRA and the codes furnishing the principal business.

The **United Wire and Supply Company** of Cranston has been awarded an order for brass and copper tubing by the **United States Navy Bureau of Supplies and Accounts.** The bulk of the order, which aggregates about $14,000, will be seamless copper tubing, in lengths of not less than twelve feet, and varying in diameter from less than two inches to more than eight inches, to be delivered to navy yards and supply depots on the west coast. Small lots of brass voice tubing included in the order will be delivered to the navy yards at Brooklyn, N. Y., and Norfolk, Va.

Norman D. Mac Leod, president and general manager of the **Abrasive Machine Tool Company,** of East Providence, has been elected first vice president of the **National Machine Tool Builders' Association.**

In its monthly report on payrolls in Rhode Island the **Brown University Bureau of Business Research** showed that the September payroll in the industries represented in the machinery and hand tools, non-ferrous metals, and jewelry and silverware were 7.03 per cent larger than those of August. The totals for September in the machinery and hand tools group was $497,469 as compared with $487,334 in August, a gain of 2.1 per cent. In the jewelry and silverware trades it was $851,889 in September and $760,529 in August, a gain of 12 per cent, while in the non-ferrous metal group, it was $120,397 in September and $114,163 in August, a gain of 5.5 per cent.

The **Uncas Manufacturing Company,** 623 Atwell's avenue, Providence, has been granted a permit by the Inspector of Buildings to erect a wood and brick addition, costing approximately $4,000, to its plant.—W. H. M.

Middle Atlantic States

Utica, N. Y.

November 1, 1934.

Metals were lagging in the Central New York area during the past month although the general condition in this area in spite of the current slump was considered much better than last year at this time.

Officials of the Industrial Association which tabulates employment figures for New York State revealed that while last year the employment in the metals in this immediate area was about 50 per cent of normal the picture today in the Central New York division shows about 70 per cent employment.

In Utica the **Brunner Manufacturing Company** was reported to be doing a good business. The **Bossert Corporation** laid off some of its executives during September while the **Savage Arms Corporation** was reported not to be doing as well as usual. The **Utica Cutlery Company** was experiencing its seasonal slump before the rush period when the holiday goods are made up.

Rome factories were reported to be going along on an even keel.—E. K. B.

Newark, New Jersey

November 1, 1934

The **Worthington Pump and Machinery** interests have acquired control of the **Carbondale Machine Company,** manufacturers of air conditioning and refrigeration equipment. The business will also be continued at Carbondale, Pa.

Watts Electric Controls have leased additional space here for manufacturing purposes. Some of the metal industry plants here report a slight upturn in business during the past few weeks.

Following Newark concerns have been incorporated: **Nu-Dome Radio Tube Corporation,** radio tubes, $125,000; **National Vita Life Corporation,** manufacture lamps, $50,000 preferred and $50,000 common; **Van Dyk & Company, Inc.,** manufacture chemicals, 1,000 shares no par; **Chemical Holding Company,** chemicals, 1,000 shares par; **Progress Ring Manufacturing Company,** rings, 100 shares no par; **Beach Tan Lamp Corporation,** manufacture lamps, $10,000 preferred and 500 shares common.—C. A. L.

Trenton, New Jersey

November 1, 1934.

Several representatives of incandescent lamp manufacturing establishments of Holland recently visited Trenton. Together with representatives of the **Phillips Company,** of New Brunswick, they inspected the plant of the **Westinghouse Lamp Company** at Trenton. Later they were luncheon guests of **William C. Hipple,** Westinghouse manager, at the **Hildebrecht Hotel.** Sodium vapor lighting in factory and outdoor storage yards has been installed at the **Westinghouse** plant. Sodium vapor lighting is said to provide an economical and effective method of illumination.

The **John A. Roebling's Sons Company,** has reduced the working hours of some of its help in order that all employees may continue at work.

Following concerns have been incorporated here: **Dollin Corporation,** Jersey City, castings, 15 shares no par; **Union Electrical Parts Company, Inc.,** Union City, 90 shares no par; **New Jersey Rivet Company,** Camden, rivets, 1,100 shares no par; **New Jersey Storage Battery Company, Inc.,** Union City, manufacture storage batteries, 100 shares no par.

—C. A. L.

Middle Western States

Detroit, Michigan

November 1, 1934.

Production in all non-ferrous metal plants was down all through the past month. This is not an unnatural condition for the season but even now no one is looking for any material change until quite a bit later.

Most of the plant officials are optimistic concerning the future and freely express themselves accordingly. A number of the most outstanding already have begun expansion work and more is planned for the next few weeks. This consists of enlarged production space, re-tooling and in a number of instances new machinery.

Most of the plating plants are in low

production following the same trend as other industries, but many believe that they will be back on schedule again in due time.

Not much may be expected from the motor car industry for several weeks but already plans are under way for new models. It is understood that no very radical changes are in prospect, although no one can tell what may be sprung when the season really opens.

Manufacturers of plumbers' supplies are inactive, a condition that has prevailed for a considerable time.

Refrigeration continues to be a bright spot in industry. Production is holding up well with prospects that it will continue until along into the winter months.

The **Jackson Aircraft Corpn.** has been incorporated at Jackson, Mich., by Fred Redmond, 751 West Franklin Street of this city. The capital stock is $50,000.

The **Excello Die Casting Company** has been incorporated at Grand Rapids, by Edward J. Hultman, 1140 Monroe Avenue, N. W. The capital stock is $25,000.

George W. Mason, chairman of the board of directors and president of the **Kelvinator Corpn.,** believes that the air conditioning industry is on the threshold of its greatest year and announces that his organization stands ready to make an aggressive bid for a large share of the 1935 sales volume that now seems to be so assured. Significant in connection with Kelvinator's decision to push air conditioning vigorously during the next year, is the fact that it is one of the few concerns which have included winter heating in air conditioning research. For a considerable time it has marketed an oil burner for home heating and only recently, in collaboration with the American Radiator and Standard Sanitary Corporation, it brought out a new self-containing unit boiler for domestic use, completely automatic in operation and equipped with the most advanced type of oil burner.

Charles B. Bohn, president of the **Bohn Aluminum & Brass Corporation,** sees a "new deal" in automotive engineering. He believes that a break is due not only in appearance, but in the entire design and construction of the high-priced motor car. "It was not so many years ago that the low-priced car would not attempt to compete in acceleration, hill-climbing or other performance qualities with cars of higher price," he said. "Today this no longer is true. Due to superior power-weight ratio the low-priced cars are able to leave the high-priced units at a standstill at the traffic lights and to out-perform them in hilly sections of the country." "What will the new cars be like?" he was asked. "They will be made of lighter materials, preferably aluminum wherever it is possible," he said. "The engines also will be more powerful due to superior bearing construction and better design throughout. The engine probably will be in the rear and the interior of the car so designed that passengers will have more comfort."—F.J.H.

Toledo, Ohio

November 1, 1934.

Although industrial conditions in this area have slowed up to a considerable extent, still, owing to the diversified products manufactured here, plant operations are more active than in some of the other areas in the Great Lakes region. So far as motor car production is concerned, it is down the same as in the other industrial centers. Outside of this, however, many plants in the non-ferrous metal field are operating with considerable strength. Generally the situation is considerably better than it was a year ago.

The plating plants are under fair production, and many expect to continue well along into the winter with little, if any, interruption. The diversified industries in Cleveland also are in about the same condition. In the motor car field, both here and in Cleveland, production is not so active. This is due, of course, to seasonal conditions, which probably will change for the better before the first of the year.

Authority to begin a manufacturing program of 5,000 to 15,000 cars at the **Willys-Overland** plant was given recently in the Federal court here. Already David R. Wilson, receiver, has started some of the departments, it is stated, and it is expected the production planned will require the employment of about 3,500 men by November 15. F. J. H.

Pacific States

Southern California

November 1, 1934.

General air conditioning installation has reached such a point, that from now on will be opened to those manufacturers, one of the largest outlets for the trade ever conceived. It is planned to push the air conditioning to every home in the country which can afford this feature and it will run into the billions of dollars. The average six room house can be fully air conditioned for $1000 and of course smaller equipment, but quite serviceable also can be sold for one quarter that cost. It has been decided that the temperature of homes, theatres, etc., should be about 15 degrees lower than the outside temperature during the summer and particular attention should be paid to dehumidifying the air.

Arnold Foerster of 407 East Chestnut St., Glendale, is making the large bronze bust of **Griffith J. Griffith,** which will be placed in the new planetarium which is nearly finished in Griffith Park, Los Angeles. This planetarium is the third one in the United States and was made in Germany.

Stewart McKee of 650 South Spring St., Los Angeles, will specialize as an engineer in chemical and industrial work.

Howard Eagleson has come to Los Angeles from the east to assume charge of the factory of the **General Cable Corporation.**

A new plant here is the **National Postal Meter Company** who have leased a large plant at 154 West Slauson Ave., Los Angeles. This concern has spent $2,000,000 in research and to develop these products for a world wide market. They will manufacture automatic meter mailing machines. Their factory has 50,000 square feet of space. **I. H. Lyons** is president of the company.

Clifton's have now gone into the gold buying business at 618 south Olive St., Los Angeles.

The **World's Fair Exposition** opens in San Diego next May. Exhibits will be shown from most all countries. There will be a large space devoted to metals, machinery, the gold and silver mining, new ideas, processes, etc. It will be a $15,000,000 exposition and the attendance is expected to be about 8,000,000 to 10,000,000. The San Francisco Exposition will be in 1937 and the Los Angeles 1938 to 1939. The San Diego Exposition will run one year.—H. S.

The North Pacific Coast

November 1, 1934.

The **Boeing Airplane Company,** of Seattle, Wash., are working on plans to construct for the Government, long range bombing planes, with a radius of 3000 miles, with a speed of 220 miles an hour.

Philo T. Farnsworth of the **Television Laboratories** of 620 Market St., San Francisco, has invented the cold cathode tube for radios, which has been sought by engineers for which it is said, improves transmission and reception.

The **General Metalware Company** of Portland, are enlarging their lines of manufacture for the home, dairy, poultry and farm.

Norman De Veaux has taken over the old plant of the **DeVeaux-Hall Motor Corporation,** at East Oakland and will manufacture automobiles.

The **E. G. Lyons & Raas Company,** of San Francisco, have gone largely into the manufacture of double shell metal screw caps for wine bottles, to be used instead of corks.

The **Reynolds Metal Products Company** of 345 9th St., San Francisco, have made alterations and improvements to this building and plant.

The **Kay Manufacturing Company,** have started the manufacture of the porcelain and steel type of commercial refrigerators for stores, at 1728 Market St., Oakland, T. L. Trummes, owner.

The **Electric Torch Manufacturing Company** is a new concern at 2442 San Pablo Ave., Oakland, J. T. Roffy, owner.

The **National Motor Bearing Company** of 460 Natoma St., San Francisco, have opened a branch factory at 78th Ave. and 14th St., Oakland.—H. S.

Metal Market Review

November 1, 1934.

Copper remained unchanged in price throughout the month, but a much better feeling became evident during the second week with a rise in domestic demand. The recent slackness has been due not to a desire on the part of consumers to break the price, but to lack of outlets. It has been stated that manufacturers are perfectly satisfied to see the metal stable at any reasonable figure.

Producers have waived their quotas for another month.

Copper and Brass Research

At the fourteenth annual meeting of the Copper and Brass Research Association held yesterday, **Frederick Laist,** chief metallurgist of the Anaconda Copper Mining Company, was re-elected president. Vice presidents elected were **Louis S. Cates,** president of the Phelps Dodge Corporation; **F. S. Chase,** president of the Chase Brass and Copper Company; **C. D. Dallas,** president of Revere Copper and Brass, Inc., and **H. Donn Keresey,** president of the Anaconda Wire and Cable Company. **C. T. Ulrich,** treasurer of the Kennecott Copper Corporation, was re-elected treasurer. The retiring directors were re-elected.

It is understood that there was some sentiment for disbanding the organization, but in view of the housing program of the United States Government it was decided to continue it, but probably on a reduced basis.

Tin was as nearly unchanged as a speculative commodity can be, beginning at 50.85 and ending the month at 51.30. Domestic demand has not been very active. New tin consumption throughout the world and in the United States as well for the first seven months of 1934 has been slightly below the consumption in the same period of 1933, but invisible or consumers stocks have been reduced in the United States by about 4,000 tons, which brings actual consumption to about 1,000 tons more than in the same period of last year. The following figures released by the National Tin Research and Development Council, New York, are interesting. Consumption in long tons of tin in 1933 were: in tinplate 13,920; in babbitt 1,610; in solder 4,160; in bronze, foil and collapsible tubes, 5,730.

Lead improved its tone, ending the month at 3.55 against 3.45 for the beginning. Refined stocks decreased over 4,000 tons in spite of an increase in production.

Zinc seems to have recovered from its sinking spell, stopping its fall at 3.80 and ending the month at 3.85. Inquiries improved during the latter part of the month. There was some news also from Joplin that producers plan to regulate their output. A rumor that the foreign cartel is to disband at the end of he year is not generally credited.

Aluminum started and continued through the major part of the month at the same level as it has held since 1930, but a few days before the close, it dropped to 22 cents. No specific information as to causes was available so outsiders can only guess at a possible combination of market conditions, politics, etc. On the horizon is the fact that the Bohn Aluminum and Brass Company of Detroit, a large and financially sound organization, has embarked on the production of aluminum from the ore on a commercial scale.

Nickel remained unchanged.

Antimony was strong, advancing from 8.875 to 9.75.

Silver was the sensation of the month. Beginning at 50.125 it was firm, rising slightly until the 11th of the month when it jumped 2½ cents and followed this with another 1½ cents over the week-end. The high point was 55.625, but it slipped back to 53 at the end. Causes were perhaps a mixture of U. S. Treasury buying, an export tax on the metal by China and possibly a slight rise in industrial consumption. The immediate future is difficult if not impossible to predict.

Platinum remained unchanged at $34. per ounce as did also **Gold** at $35.00.

Scrap Metals showed some improvement in activity and price toward the end of the month, recovering from the low state shown in the figures from the Non-Ferrous Ingot Metal Institute below. Deliveries of ingot brass and bronze were 3,757 tons in August and 3,260 in September. Prices in August were:

Commercial 80-10-10 (1½% Impurities)	10.106c.
Commercial 78% Metal	8.000c.
Commercial 81% Metal	8.088c.
Commercial 83% Metal	8.332c.
Commercial 85-5-5-5	8.590c.
Commercial No. 1 Yellow Brass Ingot	6.954c.

Wrought Metals

Activity improved slightly in keeping with the small rise in general business but there were no outstanding signs of activity or unusual promise for the winter.

Manufacturers of Sterling silver and plated ware are in a quandary because of the extraordinary action of silver. Necessarily, their prices must follow raw materials, but it is impossible to know whether to buy ahead for a rise or to hold back for fear of a fall. Probably there will be little change before the end of the year as most manufacturers carry a 60-day inventory, but adjustment may have to be made then unless silver falls back.

Daily Metal Prices for October, 1934

Record of Daily, Highest, Lowest and Average Prices and the Customs Duties

	1	2	3	4	5	8	9	10	11	12*	15	16	17
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	....	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	....	9.00	9.00	9.00
Casting (f.o.b. ref.)	7.625	7.625	7.375	7.375	7.375	7.375	7.375	7.375	7.375	....	7.375	7.375	7.375
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	3.90	3.875	3.875	3.875	3.875	3.875	3.85	3.80	3.80	....	3.80	3.80	3.80
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	50.85	50.95	50.875	50.70	50.75	50.625	50.75	50.55	50.85	....	50.75	50.90	50.85
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	3.45	3.50	3.50	3.50	3.50	3.50	3.45	3.45	3.45	....	3.50	3.50	3.55
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	23.30	....	23.30	23.30	23.30
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	....	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	8.875	9.25	9.25	9.00	9.00	9.00	9.00	9.00	9.00	....	9.50	9.75	9.75
Silver c/oz. Troy, Duty Free	50.125	50.125	50.125	50.00	50.125	50.375	50.75	51.125	53.625	....	55.25	55.625	54.375
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	....	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	....	35.00	35.00	35.00

	18	19	22	23	24	25	26	29	30	31	High	Low	Aver.
Copper c/lb. Duty 4 c/lb.													
Lake‡ (del. Conn. Producers' Prices)	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125	9.125
Electrolytic‡ (del. Conn. Producers' Prices)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Casting (f.o.b. ref.)	7.375	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.25	7.625	7.25	7.347
Zinc (f.o.b. East St. Louis) c/lb. Duty 1¼ c/lb.													
Prime Western (for Brass Special add 0.05)	3.80	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.90	3.80	3.841
Tin (f.o.b. N. Y.) c/lb. Duty Free, Straits	50.85	50.95	51.00	51.20	51.25	51.20	51.125	51.10	51.30	51.15	51.30	50.55	50.933
Lead (f.o.b St. L.) c/lb. Duty 2½ c/lb.	3.60	3.60	3.60	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.60	3.45	3.513
Aluminum c/lb. Duty 4 c/lb.	23.30	23.30	23.30	23.30	23.30	23.30	23.30	22.00	22.00	22.00	23.30	22.00	23.123
Nickel c/lb. Duty 3 c/lb.													
Electrolytic 99.9%	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00
Antimony (Ch.99%) c/lb. Duty 2 c/lb.	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	8.875	9.386
Silver c/oz. Troy, Duty Free	53.25	53.25	53.00	53.00	53.00	53.125	53.125	52.875	53.00	52.75	55.625	50.00	52.375
Platinum $/oz. Troy, Duty Free	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00	34.00
Gold—Official Price[1] $/oz. Troy	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00	35.00

* Holiday.

Metal Prices, November 2, 1934

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

NEW METALS

Copper: Lake, 9.125, Electrolytic 9.00, Casting, 7.25. **Zinc:** Prime Western, 3.825. Brass Special, 3.90. **Tin:** Straits, 51.125. Pig, 99%, 50.30. **Lead:** 3.65. **Aluminum,** 22.00. **Antimony,** 10.25. **Nickel: Shot,** 36. **Elec.,** 35.

Quicksilver: Flasks, 75 lbs., $75.50. **Bismuth,** $1.10. **Cadmium,** 55. **Silver,** Troy oz., official price, N. Y., Nov. 5, 53c. **Gold:** oz., Troy, Official U. S. Treasury price Nov. 5, $35.00. **Scrap Gold,** 6½c. per pennyweight per karat, dealers' quotation. **Platinum,** oz. Troy, $34.00.

Duties: Copper, 4c. lb.; zinc, 1¼c. lb.; tin, free, lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth, 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

INGOT METALS AND ALLOYS

	Cents lb.	U. S. Import Duty	Tax*
Brass Ingots, Yellow	6½ to 8	None	4c. lb.[1]
Brass Ingots, Red	8¼ to 11	do	do
Bronze Ingots	9¾ to 12½	do	do
Aluminum Casting Alloys	15½ to 22	4c. lb.	None
Manganese Bronze Castings	20 to 34	45% a. v.	3c. lb.[2]
Manganese Bronze Forgings	26 to 38	do	do
Manganese Bronze Ingots	9 to 13	do	4c. lb.[1]
Manganese Copper, 30%	11½ to 16	25% a. v.	3c. lb.[2]
Monel Metal Shot or Block	28	do	None
Phosphor Bronze Ingots	10 to 12	None	4c. lb.[1]
Phosphor Copper, guaranteed 15%	13¼ to 15	3c. lb.[2]	do
Phosphor Copper, guaranteed 10%	11½ to 14	do	do
Phosphor Tin, no guarantee	61 to 75	None	None
Silicon Copper, 10%	18 to 30	45% a. v.	4c. lb.[1]
Iridium Platinum, 5%	$35-36.50	None	None
Iridium Platinum, 10%	$36-37.50	None	None

*Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1]On copper content. [2]On total weight. "a. v." means ad valorem.

OLD METALS

Dealers' buying prices, wholesale quantities:	Cents lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6⅜ to 6⅝	Free	4c. per pound on copper content
Light copper	5½ to 5¾	Free	
Heavy yellow brass	3⅜ to 3⅝	Free	
Light brass	3 to 3⅜	Free	
No. 1 composition	4⅞ to 5⅛	Free	
Composition turnings	4⅝ to 4⅞	Free	
Heavy soft lead	3 to 3¼	2⅛c.lb.	None.
Old zinc	2¼ to 2⅜	1½c.lb.	
New zinc clips	2¾ to 3	1½c.lb.	
Aluminum clips (new, soft)	12¼ to 13¼	4c.lb.	
Scrap aluminum, cast	9¼ to 10	4c.lb.	
Aluminum borings—turnings	5 to 5½	4c.lb.	
No. 1 pewter	30 to 32	Free	
Electrotype or stereotype	2⅞ to 3	2⅛c. lb.*	
Nickel anodes	30 to 33	10%	
Nickel clips, new	31 to 33	10%	
Monel scrap	11 to 18½	10% a.v.	

*On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since June 12, 1934. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

COPPER MATERIAL

	Net base per lb.	Duty*
Sheet, hot rolled	16c.	2½c. lb.
Bare wire, soft, less than carloads	12.75c.	25% a. v.
Seamless tubing	17.25c.	7c. lb.

*Each of the above subject to import tax of 4c. lb. in addition to duty, under Revenue Act of 1932.

NICKEL SILVER

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	23.75c.	10% Quality	26.625c.
15% Quality	25.875c.	15% Quality	31.00c.
18% Quality	27.125c.	18% Quality	34.25c.

BRASS AND BRONZE MATERIAL

	Yellow Brass	Red Brass 80%	Comm'l. Bronze	Duty	U. S. Import Tax
Sheet	14½c.	15⅜c.	16	4c. lb.	4c. lb. on copper content
Wire	15 c.	15⅞c.	16½	25%	
Rod	13 c.	15⅞c.	16⅜	4c. lb.	
Angles, channels	22½c.	23⅝c.	24	12c. lb.	
Seamless tubing	17 c.	17¾c.	18⅝	8c. lb.	
Open seam tubing	22½c.	23⅝c.	24	20% a. v.	No tax.

TOBIN BRONZE AND MUNTZ METAL

Net base prices per pound. (Duty 4c. lb.; import tax 4c. lb. on copper content.)	
Tobin Bronze Rod	16½c.
Muntz or Yellow Rectangular and other sheathing	17⅝c.
Muntz or Yellow Metal Rod	14 c.

ALUMINUM SHEET AND COIL

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	32.80
Aluminum coils, 24 ga., base price, tons lots, per lb	30.50

ROLLED NICKEL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Net Base Prices

Cold Drawn Rods	50c.	Cold Rolled Sheet	60c.
Hot Rolled Rods	45c.	Full Finished Sheet	52c.

MONEL METAL SHEET AND ROD

Duty 25% ad valorem, plus 10% if cold worked.)

Hot Rolled Rods (base)	35	Full Finished Sheets (base)	42
Cold Drawn Rods (base)	40	Cold Rolled Sheets (base)	50

SILVER SHEET

Rolled sterling silver (November 5) 54½c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

ZINC AND LEAD SHEET

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots, standard sizes and gauges, at mill, less 7 per cent discount	9.50	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' price)	10.25	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' price)	14.25	2c. lb.
Full Lead Sheet (base price)	7.25	2¾c. lb.
Cut Lead Sheet (base price)	7.50	2¾c. lb.

BLOCK TIN, PEWTER AND BRITANNIA SHEET

(Duty Free)

This list applies to either block tin or No. 1 Brittannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. or over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 406.

Supply Prices, November 2, 1934

ANODES

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 500 lbs. or more, and subject to changes due to fluctuating metal markets.

Copper: Cast ..... 16½c. per lb.
Electrolytic, full size, 14c.; cut to size 14c. per lb.
Rolled oval, straight, 14½c.; curved, 15½c. per lb.
Brass: Cast ..... 14½c. per lb.
Zinc: Cast ..... 9c. per lb.
Nickel: 90-92% ..... 44c. per lb.
95-97% ..... 45c. per lb.
99%+cast, 47c.; rolled, depolarized, 48c.
Silver: Rolled silver anodes .999 fine were quoted Nov. 5, from 56c. per Troy ounce upward, depending upon quantity.

WHITE SPANISH FELT POLISHING WHEELS

Diameter	Thickness	Under 50 lbs.	50 to 100 lbs.	Over 100 lbs.
10-12-14 & 16	1" to 2"	$2.95/lb.	$2.65/lb.	$2.45/lb.
10-12-14 & 16	2 to 3½	2.85	2.55	2.35
6-8 & over 16	1 to 2	3.05	2.75	2.55
6-8 & over 16	2 to 3½	3.00	2.70	2.45
6 to 24	Under ½	4.25	3.95	3.75
6 to 24	½ to 1	3.95	3.65	3.45
6 to 24	Over 3½	3.35	3.05	2.85

	Any Quantity		
4 to 6	Under ½, $5.00	½-1, $4.85	1 to 3, $4.75
1½ to 4	" 5.55	" 5.40	" 5.35
1 to ½	" 5.85	" 5.70	" 5.60

Extras: 25c per lb. on wheels, 1 to 6 in. diam., over 3 in. thick.
On grey Mexican wheels deduct 10c. per lb. from above prices.

COTTON BUFFS

Full disc open buffs, per 100 sections when purchased in lots of 100 or less were quoted July 2:

16" 20 ply 84/92 Unbleached	82.11
14" 20 ply 84/92 Unbleached	62.92
12" 20 ply 84/92 Unbleached	47.27
16" 20 ply 80/92 Unbleached	67.64
14" 20 ply 80/92 Unbleached	51.91
12" 20 ply 80/92 Unbleached	39.09
16" 20 ply 64/68 Unbleached	60.41
14" 20 ply 64/68 Unbleached	46.41
12" 20 ply 64/68 Unbleached	35.00

⅛" Sewed Buffs, per lb., bleached or unbleached 43c. to 1.09

CHEMICALS

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.13½-.16
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.04½-.05
Chromic, 100 and 400 lb. drums		.15-.15¼
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.03
Hydrochloric, C. P., 20 deg., carboys	lb.	.06½
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.05-.06¼
Nitric, 42 deg., carboys	lb.	.07-.08
Sulphuric, 66 deg., carboys	lb.	.02
Alcohol—Butyl, drums	lb.	.13½-.14½
Denatured, drums	gal.	.475-.476
Alum—Lump, barrels	lb.	.03¼-.04
Powdered, barrels	lb.	.03½-.05
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.50-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.02¼-.02¾
Cadmium oxide, 50 to 1,000 lbs.	lb.	.55
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05½-.06
Chrome, Green, commercial, bbls.	lb.	21½-23½
Chromic Sulphate, drums	lb.	.33-.55
Copper—Acetate (Verdigris)	lb.	.21
Carbonate, 53/55% cu., bbls.	lb.	.15-.16½
Cyanide (100 lb. kgs.)	lb.	.38-.40
Sulphate, tech., crystals, bbls.	lb.	4.55-5c.
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs.,	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour	lb.	.06
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.01½
Lead—Acetate (Sugar of Lead), bbls.	lb.	.10-.13½
Oxide (Litharge), bbls	lb.	.12½
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) 100% synth., drums	gal.	.42½
Nickel—Carbonate, dry, bbls.	lb.	.35-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 ib. bbls.	lb.	.12-.13
Salts, double, 425 lb. bbls.	lb.	.12-.13
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07½-.08425
Potassium—Bichromate, casks (crystals)	lb.	.08⅝
Carbonate, 96-98%	lb.	.08¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Gold Cyanide	oz.	$15.45*
Pumice, ground, bbls.	lb.	.02½
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Rouge—Nickel, 100 lb. lots	lb.	.08
Silver and Gold	lb.	.65
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.47
Cyanide, 100 oz. lots	oz.	.51-.56
Nitrate, 100 ounce lots	oz.	.39
Soda Ash, 58%, bbls.	lb.	.0252
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.16½-.22
Beryllium fluoride ($2NaF.BeF_2$)	lb.	4.30-7.00
Gold Cyanide	oz.	$17.10*
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	3.55-3.70
Nitrate, tech., bbls.	lb.	.02¼
Phosphate, tribasic, tech., bbls.	lb.	.03¾
Silicate (Water Glass), bbls.	lb.	.01½
Stannate, drums	lb.	.34-.37
Sulphocyanide, drums	lb.	.30-.45
Sulphur (Brimstone), bbls.	lb.	.02
Tin Chloride, 100 lb. kegs	lb.	.39
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.11-.12
Cyanide (100 lb. kegs)	lb.	.38
Chloride, drums, bbls.	lb.	.07½-.10
Sulphate, bbls.	lb.	.033-.037

*Gold and silver products subject to fluctuations in metal prices.